Railway Age

DAILY EDITION

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Planning Expenditures Now for 1931

"ALL points are again urged to keep before them the necessity of keeping in mind and submitting their needs in the way of machinery, shop equipment, etc., for the year 1931 so that we will have this before us in advance of the time needed to submit our requirements to the management, allowing sufficient time to go over the various items, secure estimates, etc., and be prepared to submit our entire budget with a knowledge of what should be actually required. It so often happens that important improvements are omitted, we not having given the matter sufficient forethought."

This quotation is from a communication sent out recently by the head of a mechanical department to all the repair shops and engine terminals under his jurisdiction. There are some railroad managements which are optimistic as to business conditions in the near future. It may be taken for granted that no mechanical department officer would send out a communication such as this unless he had good reason to believe that his superiors were planning to make appropriations for needed equipment during the coming year.

Modern Shops and Terminals

A STRIKING example of what can be accomplished by taking something old and making it capable of meeting present-day demands efficiently is found in the reconstruction of antiquated back shops and engine terminals. The results from a capital expenditure standpoint are often surprisingly low. What makes these rebuilt facilities modern? Is it not their capacity for meeting all essential demands just as satisfactorily as would be possible in a new structure? Not much ingenuity is required to improve upon engine terminal design of the eighties.

Likewise, an old back shop may become essentially modern by the acquisition of some new machine tools and a systematic rearrangement of existing machinery. In a locomotive terminal, adequate coal and ash-handling facilities, up-to-date machine tools, drop tables, power crane trucks, stall cranes, etc., will effect a striking improvement. The installation of modern stationary boilers or old boilers with a new high setting, and piping throughout the enginehouse for washing, filling and steaming locomotives will, in many cases, assist materially in handling the modern super-power locomotive just as efficiently at the terminal as it is operated on the road. What better definition of a modern terminal could be desired?

More Careful Reclamation

THE report of the joint committee of the Mechanical and Purchases and Stores Committee on Reclamation, which was presented last week before the Purchases and Stores Division and before the Mechanical Division yesterday calls for further comment. The report deals principally with the reconditioning of fractures of couplers by welding. The committee has taken couplers that have not merely suffered wear or distortion but which are badly fractured across the face, the back, through the pin holes, in the shank, etc., and attempted to repair them by welding. By testing these specimens it has clearly demonstrated the importance of annealing in all welding operations, and insofar as it has established that essential in repair work of this kind it has contributed to progress. But it is surprising that some of the couplers used in the studies should have been considered fit for such attention. The results of the tests themselves strongly suggest the futility of such work. Disregarding the important question of costs in such undertakings, it should be agreed upon by the practical railway men, and particularly the men that must apply used and repaired couplers, that the time can come in the life of material when all attempts at repair are but wasted effort and retirement is the only sensible course.

The committee appears to have found considerable satisfaction in tests which disclose that any after breakage occuring in the repaired couplers did not take place in the weld, but what assurance is there in actual practice that a coupler which has been badly fractured in one place has not been weakened in other places?

There is no question whatever that fractured and otherwise discarded material can be repaired. The practical railway man is equal to any problem of this kind, but it is the condition of that repaired article and its ultimate cost and service that is the most important question.

It has been contended that the railways have run wild on some forms of reclamation. If such is the case, and there is evidence to support such claims, the need at present is not so much "more reclamation" as it is more careful reclamation. Indeed, in the interests of true economy, safety and progress in the railway business rationalization is what is needed and it is hoped that the joint committee can be relied on to encourage it.

Electric Traction Tendencies

A STUDENT of the electric traction situation in the United States recently saaid: "There is no 'battle of the systems,' today, but instead we definitely have two systems to choose from, each of which can be shown to be completely reliable and capable of filling almost any railroad need. From some points of view, it is of course disadvantageous to electrify the lines of the country with two systems, since it is somewhat equivalent to working with two track gages, yet the fact that these two systems are definitely here has to be faced, for they are likely to remain with us throughout the long future".

This is a pointed statement—in effect a spotlight which brings two fundamental points into relief. First, while there is no "battle of the systems" in the form of public debates on the relative merits of alternating and direct-air current systems, most of the technical men working with one system are in complete disagreement with those working on the other. The second is that there are still a few who believe that the use of two systems is a great mistake and that some means should be found to establish at least one kind of power for the overhead contact system. Probably the only satisfactory way of establishing such a system, if it is to be done, would be by railroad men in convention assembled. Moreover, if it is to be done, there is no better time than the present. The cause will be a losing one if action is postponed too long.

The Cost of Stopping a Train

THERE were several occasions during the conventions last week when speakers had occasion to refer to the cost of stopping trains. This question of costs incidental to stopping trains and setting out cars comes up frequently in the discussion of papers and committee reports. An article on this subject appeared in the March 22, 1918, issue of the *Railway Age*, page 708, which dealt exclusively with the cost of recovering the energy lost in stopping. It was estimated that the cost of stopping a passenger train of 560 tons, running at a speed of 50 miles an hour, varied from 84 cents to $2.80, and the cost of stopping a freight train of 4,000 tons, running at a speed of 30 miles an hour, varied between $1.44 and $4.80. These figures were based on prices and wage rates in effect in 1918. Estimates made by an eastern road several months ago, which were calculated by the same methods described in the article referred to, show that the minimum cost of stopping a freight train of 4,000 tons has increased from $1.44 to $2.50, or 74 per cent.

The same road has calculated the cost of setting out a car on account of a hot box, cut journal, changing wheels, or pulled drawbar, as approximately $30.00. This estimate includes the cost of stopping and starting the train ($2.50), train expense per train hour (wages, fuel and water), setting the car out, picking up the car, per diem, changing the wheels and turning the journal, or repairing or changing the coupler or draft gear. There are other elements which enter into this cost that could not be included because the cost varies at different terminal points, such as switching the car from the yard to the repair track, the expense of moving the car to the nearest repair track, preparing the car for movement to the repair track, and the potential value of the car to the road from a revenue producing standpoint, which varies according to the demand for cars. The management of the road estimates the *total* cost of stopping a train to set out a car as between $60.00 and $75.00, and considers this estimate to be a conservative figure.

Investigate New Materials Impartially

FOR a number of years it has been accepted practice to construct the entire body or superstructure of hopper cars of steel sections and plates. Such construction permitted the railroads to enjoy an extremely serviceable type of car at a comparatively low cost, insofar as maintenance is concerned. The steel hopper car has been in service a sufficient length of time that figures concerning its maintenance and data concerning its average serviceable life can be quite readily determined. The problem now on most roads, insofar as this type of equipment is concerned, is to develop the use of different materials of construction that will increase the service life of these cars by combating abrasion and corrosion in those portions of the car at or below the side sill connections.

Within the past two years two materials—one new and one quite old—have demanded serious consideration in hopper-car construction. Years ago wrought iron was considered a most valuable material for use where corrosion was an important factor. Under methods of producing wrought iron at that time its cost of manufacture was such as to prohibit its extensive use in car construction. Recent developments have made possible the production of wrought iron plate at a cost which makes it highly desirable for the railroads to consider the advisability of using this material in those portions

of a hopper car where corrosion and abrasion are most destructive. In combating both of these actions this material is most effective. More recently the use of high strength aluminum alloy plate in hopper car construction has made its demand for the consideration of railroad car men.

The possibilities of adopting these materials with the idea of increasing the average number of years between shoppings for general repairs are important enough to warrant a most thorough study of their adaptation to car construction. In both cases the railroad man's natural inclination may be adverse to considering such materials because of their relatively higher price, but at the present average annual maintenance costs on steel cars savings that can be anticipated through a material increase in average service life seem to be great enough to warrant the use of higher quality materials in certain portions of a car.

It has been accepted as a foregone conclusion that corrosion and abrasion are enemies which must be expected to destroy hopper cars. Until now this may have been true, but it seems that research and modern manufacturing methods have succeeded in producing a variety of materials that are of real utility to the car designer.

Your Greatest Obligation

IN his address before the Mechanical Division the other day, M. J. Gormley made the following statement: "The morale of railroad employees is one of the most inspiring things in the industry. Ever since the railroads have been operating they have been thought of as offering advancement commensurate with service and ability. Generations of families have given their services to one railroad and they have come to love it as a part of their lives. I have seen men fight in resentment at disparaging remarks about their railroad. Can we afford to risk the destruction of that spirit. . . .?" True, Mr. Gormley was talking about the relation of college men to the railroads but the above remarks are so pertinent to a subject of greater importance that we hope we may be forgiven for turning the thought into another channel.

Every mechanical officer is the custodian of one of the most valuable of his company's assets, intangible though it may be—the spirit of his organization. In times of stress, at the peak of traffic demands, and in times of depression and discouragement the rest of the railroad world has a pretty good opportunity to observe what kind of a leader a man really is by the spirit of the organization he leads.

There is every reason to feel proud of the industrial accomplishments of the past decade, but industry is beginning to realize that the excellence of the manner in which it has solved some of the problems of transportation, production and marketing has injected two problems that may be far more difficult to deal with because they do not submit as readily to analysis. These are the problems of human relations and employment.

The railroads, as an industry, have been accused of being rather slow to take hold of new ideas. For once this characteristic may prove to be of immense value for, *if it is true* that in some things the railroads are somewhat behind other industries, they will at least have a most excellent opportunity to observe the mistakes that have been made by others under the business pressure of the past four or five years and profit thereby. The automobile industry, long held up to the railroad mechanical department man as a shining example of the value of modern production methods, now has problems of its own the study of which will provide some measure of comfort to those shop supervisors who have possibly been of a more conservative nature.

Railroad men have for some time past been deeply concerned with the problem of stabilizing employment but it is possible that they may never have placed a proper value on the relation to that problem of the morale of an organization. One railroad officer summed this up not long ago in the statement that in his shop production would drop 20 per cent within an hour after a bulletin had been posted concerning short time or a lay-off.

It is not the purpose here to discuss at length the details of either of these problems. They have been before us for some time, are with us at present and will be with us to an increasing extent in the future. We have gone home from previous conventions inspired to greater effort to increase shop output, to decrease fuel consumption, or to rise to greater heights in the reduction of mechanical-department operating expenses. These jobs have been put across and our efforts have been recognized. In the satisfaction of accomplishment it may not have occurred to us what a hopeless task some of these things might have been if we had not had the "spirit of the organization" behind us.

Mr. Gormley's remarks should at least serve to remind us that our greatest obligation to the future is not "to risk the destruction of that spirit."

Program for Today

FOR the first time since the Mechanical Division assembled last week, it will be the only railroad organization to meet in Atlantic City today, although there is a meeting of the American Society for Testing Materials in Haddon Hall, near the other end of the Boardwalk. The Mechanical Division meets at 9:30 a. m., daylight saving time, in the room to the right of the stage in the main exhibit hall of the Auditorium. It will adjourn for the day at 12:30 p. m. The program follows:

Mechanical Division

Address: Samuel M. Vauclain, Chairman of the Board, Baldwin Locomotive Works.

Discussion of Reports on:

Locomotive Design and Construction.
Electric Rolling Stock.

Entertainment

10.30 A. M.—Orchestral Concert, Ball Room. William Klaiss, Feature Pipe Organist. Indoor Golf.

3.30 P. M.—Orchestral Concert, Ball Room. William Klaiss. Feature Pipe Organist. Indoor Golf.

9.00 P. M.—Cotillon Night, Ball Room, Informal Dancing. William Klaiss, Feature Pipe Organist.

The Four Melody Harmonists.
Special Features.

Found

Rubber air cushion. Apply at office of secretary-treasurer, in the Auditorium.

Brake Test Movie To Be Shown Again

ONE of the most interesting features of the convention was the moving picture, in four reels, shown in connection with the report of the Committee on Safety Appliances, as read by H. H. Johnson, director of research in charge of the Power Brake Investigation. This moving picture, which illustrates the operation of the test train and method of making the air brake tests on the Siskiyou line of the Southern Pacific, will be shown again during today's program of the Mechanical Division for the benefit of members who have not seen it before.

Grand Ball Last Night

THE Ball Room of the Auditorium was the scene last night of the second formal function of this year's conventions. The Grand March was started at 9:30 and the procession was led by the following guests of honor with their ladies: G. E. Smart, G. E. Ryder, E. Wanamaker, S. G. Down, V. R. Hawthorne and J. D. Conway.

As an added feature of the evening's entertainment Mae Mackie, contralto of the Philadelphia Civic Opera Company, sang several songs. William Klaiss, feature pipe organist, and the Four Melody Harmonists, male quartette, rendered a number of very pleasing selections. The credit for the success of this social function is due to a sub-committee acting under the direction of G. L. Gordon, chairman of the Entertainment Committee. The chairman and the vice-chairman are, respectively, L. J. McCombs and J. H. Van Moss. The committee members are as follows:

H. G. Barbee	C. Jarden
W. L. Bayer	I. H. Jones
A. E. Biddle	A. G. Johnson
L. T. Burwell	B. S. Johnson
L. A. Carpenter	J. C. Kuhns
H. O. Fettinger	E. Laterman
J. W. Fogg	L. B. Rhodes
O. C. Hayward	J. C. Shields
W. J. Hedley	C. W. Sullivan
C. M. Hoffman	J. R. Wetherald

Registration Figures

THE figures for registration at four o'clock yesterday, Monday afternoon, are given in the following table, as compared with those for the same time at the four previous conventions. The large size of the enrollment of railroad officers and guests is most gratifying.

	1922	1924	1926	1928	1930
Mechanical, Division V	950	1143	1340	1389	1478
Purchases and Stores, Division VI	333	365	486	491	533
Motor Transport, Division VII				56	71
Railroad guests				588	775
Railroad ladies	924	1075	1140	1236	1114
Supply men	2285	2613	3084	2605	2511
Supply ladies	569	673	700	32	164
Special guests	800	809	738	32	164
Complimentary				299	—*
Total	5861	6678	7482	7427	7234

*Complimentary registrations this year are included in railroad guests.

Fuel Convention Supply Men Meet

AN impromptu meeting of the incoming officers and executive committee members of the International Railway Supply Association was held Monday to discuss plans for the next annual convention of the International Railway Fuel Association. Thefollowing were in attendance at the meeting: President S. A. Witt, Detroit Lubricator Company; Vice-President L. R. Pyle, Locomotive Firebox Company; Secretary C. M. Hoffman, Dearborn Chemical Company; Treasurer Bert Fuller, Hunt-Spiller Manufacturing Company. Members of the Executive Committee included John Baker, Locomotive Firebox Company; J. W. Fogg, MacLean-Fogg Lock Nut Company; John Bacon, Cut-Off and Speed Recorder Corporation, and F. Fisher, Pilliod Company. Past presidents included C. O. Jenista, Barco Manufacturing Company; M. K. Tate, Lima Locomotive Company, and Bard Browne, Superheater Company.

Mayor Ruffu Killed

CONVENTION attendants were greatly shocked yesterday morning when they learned of the tragic death of Mayor Ruffu. The automobile in which he was returning from Absecon to Atlantic City with three companions, was struck by a train early Monday morning. The car was demolished and the occupants killed.

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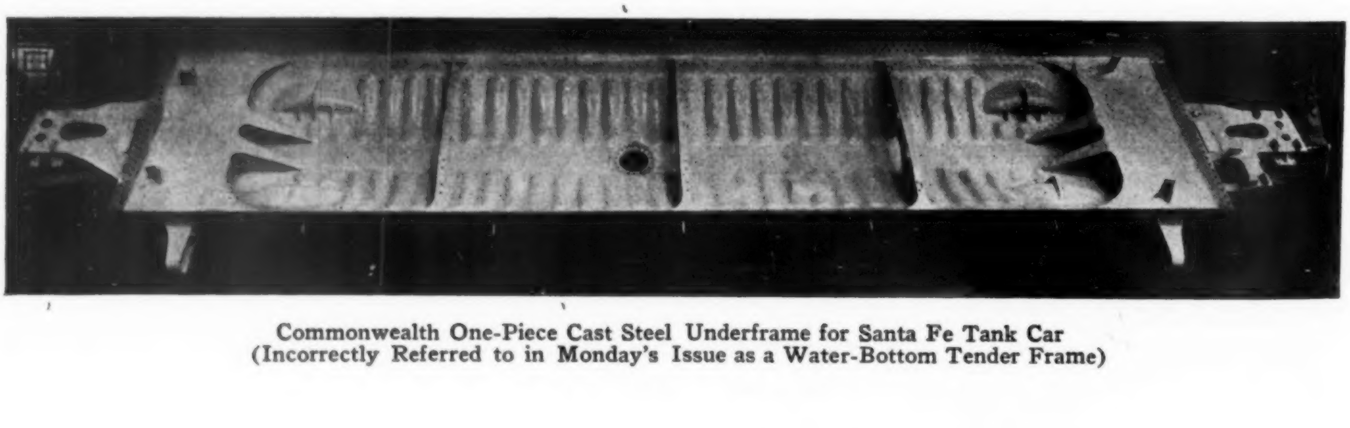

Commonwealth One-Piece Cast Steel Underframe for Santa Fe Tank Car (Incorrectly Referred to in Monday's Issue as a Water-Bottom Tender Frame)

Mayor Anthony M. Ruffu, Jr., in 1927 succeeded Mayor Bader, who was so long and favorably known to Mechanical Division members and the railway supply fraternity. Mayor Ruffu was scheduled to give the welcoming address at the convention this year, but other duties prevented his so doing and he was represented by one of his associates. It was largely through the efforts of the mayor that the conventions were retained in Atlantic City two years ago. The Million Dollar Pier had been outgrown and the annex which had been erected across the Boardwalk in 1926 was unsatisfactory. The Mechanical Division and R. S. M. A. officers insisted that better facilities must be afforded, and as a result the Atlantic City authorities finally agreed to permit the erection of Machinery Hall on the beach, and directly connected to the Million Dollar Pier.

Registration, American Railway Association

Division V—Mechanical

Abbott, J. M., Asst. For., P. R. R., Traymore
Adams, C. W., M. M., M. C., Ritz
Albers, L. H., Supvr. A. B., N. Y. C., Haddon Hall
Allen, L. L., M. M., M. & P., Ambassador
Alserb, F., For., P. R. R., Iriquois
Alter, J. M., M. P. I., Penna.
Althouse, Frank H., Asst. For., Reading
Ambrose, D. M., Asst. M. M., B. & O., Ambassador
Ambrose, W. F., M. M., A. & S., Chalfonte
Anderson, W. L., Asst. R. F. E., Penna.
Andreucetti, Jos. A., Electrical Eng., C. & N. W., Ritz
Angel, C. M., Asst. Engr., C. & O., Ritz-Carlton
Armer, A. M., M. M., P. R. & E., Shelburne
Armstrong, J. M., Gen. For., M. P., Shelburne
Babo, Michael, Loco. Insp., E. J. R. R. Term.
Baker, Roy E., Gel. Air Brake Insp., B. & M., Shelburne
Baldinger, F. A., M. M., B. & O., Princess
Baldwin, T. C., M. M., N. Y. C. & St. L., Ritz-Carlton
Ball, J. H., Asst. T. M., Penna.
Ballenberger, H., M. M., S. A. L., Shelburne
Barba, C. E., Mech. Eng., B. & M., Chalfonte
Barnhart, S. H., Asst. Val. Engr., N. & W., Ritz Carlton
Barrett, C. D., Asst. Engr. T., P. R. R.
Barry, J. J., A. S. M. P., N. & W., Ritz-Carlton
Baumbush, A. J., Gen. For., N. Y. C., Pennhurst
Baxter, James, Asst. For., P. R. R.
Beason, W. R., A. R. F. of E., P. R. R.
Beaver, R. C., A. M. E., B. & L. E., Haddon Hall
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Beecker, H. G., Shop Supt., D. & H., Traymore
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Bennett, F. H., M. M., M. C., Ritz
Berg, Karl, Asst. Supt. Motive Power P. & L. E., Haddon Hall
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Bickley, W. P., M. M., Penna.
Billace, Lewis S., A. E. E., B. & O., Haddon Hall
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Bissett, J. R., Mech. Insptr., S. A. L., Shelburne
Blocker, R. V., Asst. S. M. P., E. R. R., Chalfonte
Blossom, H. F., Asst. Engr., N. Y. C., Jefferson
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Boyer, Wm. E., Draft., Reading, Knickerbocker
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Brown, C. G., M. M., P. & R., Brighton
Brown, R. M., S. M. P., N. Y. C., Traymore
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Claar, Charles W., Asst. R. F. E., Reading
Clark, F. H., Advisor, Chnese Govt. Rys., Ambassador
Clark, R. S., Supv. Fuel, N. Y. C.
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Gallagher, R. E., Asst. E. E., L. & N., Ambassador
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Gardner, Harry, Machinist, Reading, Wiltshire
Geddes, Jas. R., Genl. Supt., M. C. and A. & S., Haddon Hall
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Goodwin, J. E., Prod. Eng., M. P., Haddon Hall
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Gordy, Howard P., Draf., B. & O., Kentucky
Gould, F. E., Engr. El. Eq., N. Y. C.
Grady, J. F. M. M., N. Y. N .H. & H., Marlboro
Graham, F. M., Asst. Engr. Stds., Penna.
Graham, J. G., Mt. Engr., W. Va. Trans. Co., Ambassador
Grant, James S. M. P., A. C. L., Lewellyn Apts.
Graves, J. R., A. E. M. P., N. Y. C.
Greenwood, H. G., S. of S., N. & W., Ritz-Carlton
Griffith, W. G., M. M., P. M., Marlborough
Griffitts, David, F., Penna.
Groom, Fred, Asst. C. C., B. & O., New Richmond
Grove, J. R., M. M., W. T., Ambassador
Gruver, W. A., Asst. R. F. E., Reading, Strah
Haff, S. S., R. F. E., L. I.
Hagan, J. S., E. E., C. R. R. of N. J., Dennis
Hall, E. R., R. F. E., C. & O., Raleigh
Hamilton, Geo., E. E., Erie, Arlington
Hamilton, James T., Con. Engr., D. L. & W., Ambassador
Hamilton, T. P., Draft., M. K. & T., Ritz-Carlton
Hamm, W. C., M. E., C. V., Chalfonte
Haneman, Charles, E. S. E., Reading, Wiltshire
Hanson, Harry C., I. C. C. Insp.
Haring, W., F., B. & O.
Hark, O. F., G. M. M., N. & W., Ritz-Carlton
Harley, J. O., G. F., S. & A., Knickerbocker
Harmison, W. E., M. M., Erie R. R., Traymore
Harper, G. C., G. L. Supt., Montour
Harris, H. Y., M. M., S. A. L., Princess
Hartland, C. H., Blr. For., P. R. R., Haddon Hall
Hata, T., Pres. Rep., Japanese Govt. Rys., Chelsea
Hatch, P. H., Engr. of Aut. Equip., N. Y. N. H. & H., Haddon Hall
Hauer, E. R., Asst. Shop Supt., C. & O., Shelburne
Hawk, E. Thompson, Gen. For., Reading, Knickerbocker
Hay, Clinton W., Clk., B. & O.
Hayes, W. E., Eng., D. L. & W., Ludy
Headland, E. W., F. T. M., Penna.

Hebrank, M. M., Fore. Retired, P. R. R., Altamont
Herold, Otto, Asst. Engr., Reading Co.
Herrold, A. E., M. M. & M. C. B., M. C., Penn Hurst
Hill, E. S., For., P. R. R.
Hill, Frank J., C. E., M. C., Ritz
Hines, J. P., M. M., B. & O., Shelburne
Hitch, C. B., General M. M., C. & O., Traymore
Hobson, W. P., M. M., C. & O., Haddon Hall
Hoffman, C. T., Genl For., P. R. R., Haddon Hall
Hoffman, W. G., Paint For., C. R. R. of N. J., Lexington
Hopper, Frank, Mech. Insp., M. K. & T., De Ville
Horiki, Kenzo, G. P. A., Japanese Govt Ry., Chelsea
Horst, A. L., V. P., C. & I., Ambassador
Houpt, H. H., S. M. P., P. R. R., Ambassador
Houspebeler, A. P., Mech. Supt., M. P., Shelburne
Houston, F. T., M. M., P. R. R., Shelburne
Howley, T. F., Sup. Fuel & Loco. Opr., Erie, Dennis
Hubbell, Charles C., P. A., D., L. & W.
Huber, H. G., M. M., Penna., Chalfonte
Hunt, C. T., Asst. M. M., P. R. R.
Hunt, Robt., Mech. Engr., S. A. L., Ambassador
Hunt, S. F., G. F., P. R. R., K. C.
Hunter, N. V. R., Supvr. Track, Penna.
Hurst, W., S. & T. S., N. Y., N. H. & H., Ambassador
Ingling, J. E., Asst. to G. M., Erie
Ingram, H. G., Gang For., P. R. R.
James, Geo. H., Asst. Rd. For., Penna., Elberon
James, Grant, S. M. P., A. C. L., Lewellyn Apts.
Jennings, J. F., S. M. P., M. C., Haddon Hall
Johns, John, Conductor, N. Y. C., Ludy
Johnson, C. C., For., P. R. R.
Johnson, Geo. T., Asst. Elec. Engr., N. Y., N. H. & H., Ritz-Carlton
Johnston, M. J., Ch. Inspct., C. N., Princess
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Jones, E. A., Asst. to V. P., Lehigh Valley
Jost, J. William, Draft., Reading
Joyce, E. F., Wkr. For., P. R. R
Kane, J. F., M. M., Erie, Princess
Kaufman, Allen, Y. M., Reading
Kehler, R. B., A. For., Reading, Brady House
Keller, Raymond W., Elec. For., C. R. R. of N. J., Traymore
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Kelly, W. T., M. E., I. C., Dennis
Kerns, A. U., Shop Insp., P. R. R.
Kincaid, C. L., E. E., L. & N., Ambassador
Kloss, J. E., Engr. S. & Mach., N. Y. C. & St. L., Ritz-Carlton
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Krellen, H. I., Draft., N. Y. C.
Kroger, H. F., Eng. Dept., N. Y. C., De Ville
Kueck, E. J., Mech. Engr., St. L. S. W., Princess
Kuhn, E. A., Asst. E. M. P., C. & O., Ritz-Carlton
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Lanning, H. H., Mech. Engr., A. T. & S. F., Haddon Hall
Lawhon, A. M., M. M., Southern Ry., Shelburne
Leach, J. T., M. M., Penn., Strand
Lehman, Edw. L., C. C. to S. M. P., Lehigh Valley
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Lenich, C. R., G. B. F., Reading, Green Gables
Lewis, J. C., R. F., R. E. & P.
Liddle, James G., Asst. For., Reading, Somerset
Linderman, F. A., Div. S. M. P., N. Y. C., Haddon Hall
Lingenfelter, Maurice H., M. P. I., P. R. R., Guest House
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McMillan, A. E., Dist. M. M., B. & O., Princess
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McPherson, W. G., M. M., C. P., Ritz
McQuiddy, J. H., Gen. Mach. For., Mo. Pac., Haddon Hall
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Merson, J. W., For., B. & O., Jefferson
Meyer, C. G., C. C. to S. M. P., N. Y. C. & St. L. R. R., Ambassador
Michel, Fred., Insptr., B. & O., Madison
Miller, K. F., E. of T., Erie, Ambassador
Miller, K. T., E. of T., Erie, Ambassador
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Mitchelton, S. A., Gang For., Penna.
Mitten, P. J., P. R. T.
Mock, P. S., Asst. M. M., L. I.
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Moler, A. L., Supvr. of Lub., C. & O., Princess
Moores, Geo. O., Engr., of Const., B. & O., Arlington
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Mullen, D. J., S. M. P., C. C. C. & St. L., Traymore
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Nancarrw, H. L., M. M., P. R. R
Nance, O. H., P. & G. M., M. & P., Ambassador
Nelson, C. W., Sup. T. C. & T. L., C. & O., Princess
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Nicholas, R. H., Genl. Loco. Inspr., N. Y. C., Lyric
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O'Donnell, B., Supt. Shops, N. P., Shelburne
Orr, B. F., Supt. Shops, C. C. C. & St. L. Ry.
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Perrine, N. M., M. M., C. R. R. of N. J., Dennis
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Peterson, Wm. A., Shop Eng., C. P. Ry., Haddon Hall
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Powers, T. F., A. S. M. P. & M., C. & N., Knickerbocker
Prettyman, A. J., For. Elect., N. Y. C., Princess
Pribble, B. S., C. C., R. F. & P. R. R., Haddon Hall
Prindall, W. H., M. M., B. & O., Chelsea
Quigg, J. R., R F E., K. C. T., Traymore
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Quinn, S. H., G. F., P. R. R.
Ralston, A. L., Mech. Supt., N. Y., N. H. & H., Haddon Hall
Rambo, J. B., Asst. R. F. E., L. I.
Rankin, G. W., Asst. M. M., L. & N., Traymore
Raymond, A. A., S. F. & L Per., N. Y. C., Haddon Hall
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Reilly, James R., Gen. For., C. R. R. of N. J.
Rentschler, H. W., S. of S., Reading
Reusch, H. E., Gen. C. Insp., D. & H., Princess
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Richards, Lewis, F. E. H., Reading, Arlington
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Ritter, O. H., M. M., New Haven, Traymore
Robertson, G W., M. M., C. & O., Ritz-Carlton
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Root, E. E., M. M., D., L. & W.
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Schad, J. W., M. M., B. & O., Madison
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Sealey, G. L., Elec. Eng., Reading, Knickerbocker
Seeley, Geo. E., Ch. Draft., Lackawanna, Ambassador
Seitz, Geo. H., Res. Engr., Reading
Shadle, Frank, For., Reading
Shaffer, Luther W., Asst. For., Reading
Shaffner, Chas., F., Penna., Windsor
Shaibley, C. K., R. F. E., Penna., Penn Atlantic
Sheehan, D. J., Spl. Engr., C. & O., Ritz-Carlton
Shugars, Geo. C., G. L. Insp., Reading
Shultz, L. C., M. M., S., Traymore
Siegfried, Milton A. A. R. F. E., C. R. R. of N. J., Terminal
Silcox, H. E., A. E. W. S., C. & O.
Simpson, F. C., M. M., S., Kentucky
Singer, J., Gen. M. M., N. Y. C., Ambassador
Sittler, W. J., Asst. For., Reading
Slagle, C. G., M. M., B. & O., Chalfonte
Slanker, Geo. E., Eng. Insp., Reading, Terminal
Sloan, J. R., Ch. Elec., P. R. R.
Small, H. L., A. E. S. F., B. & O.
Smith, C. B., Engr. Tests, B. & M., Haddon Hall
Smith, Clyde C., Shop I., P. R. R., Elberon
Smith, E. K., Fore., P. R. R., Monticello
Smith, Harry T., Insptr., P. R. R.
Smith, J. H., Ch. Depts., C. R. R. of N. J., Edison
Smith, J. T., Clk. Ch. M. P., Penn., Dennis
Smith, Jacob W., Engr., Reading
Smith, P. F., Mech. Eng., C. & N. W., Ambassador
Smith, P. F., Jr., E. M. P., P. R. R., Shelburne
Smith, R. A., Ch. Draft., C. P., Ambassador
Smith, R. H., Supt., N. & W., Traymore
Smith, Walter H., Asst. Engr., Reading
Snyder, David F., F., C. R. R. of N. J.
Snyder, J G., F. E. H., P. R. R., Haddon Hall
Snyder, Rudolph, For., Penna.
Southard, S. S., A. R. F. of E., P. R. R.
Springer, H. C., S. I., Penna., Elberon
Sproesser, Geo. W., For., Reading, Elberon
Squins, Wm. G., M. M., N. Y. N. H. & H., Haddon Hall
Stevens, H. R., M. M., A. C. L., Lewellyn
Stevenson, R. C., For., P. R. R.
Stevenson, R. J., For., Reading
Stewart, T. R., Sup. Shops, B. & O., Haddon Hall
Stimmel, R. M., Chemist, C. & O.
Street, W. L., T. R. E., B. & O.
Strickland, B. V., Ch. S. I., Reading
Strickler, W., Car Dist., Penn.
Summers, E. J., Fuel Sup., C. M. & St. P.
Sumner, A. W., A. M. M., Penna., Dennis
Sumner, Eliot, Asst. Gen. S. M. P., P. R. R.
Sutherland, F. B., M. P. Insp., Penna.
Sweetman, E. M., Supt. M. P., S., Traymore
Swope, Bruce M., Supt. Motive Power, Penna.
Tapman, Walter H., G. M. I., B. & O., Haddon Hall

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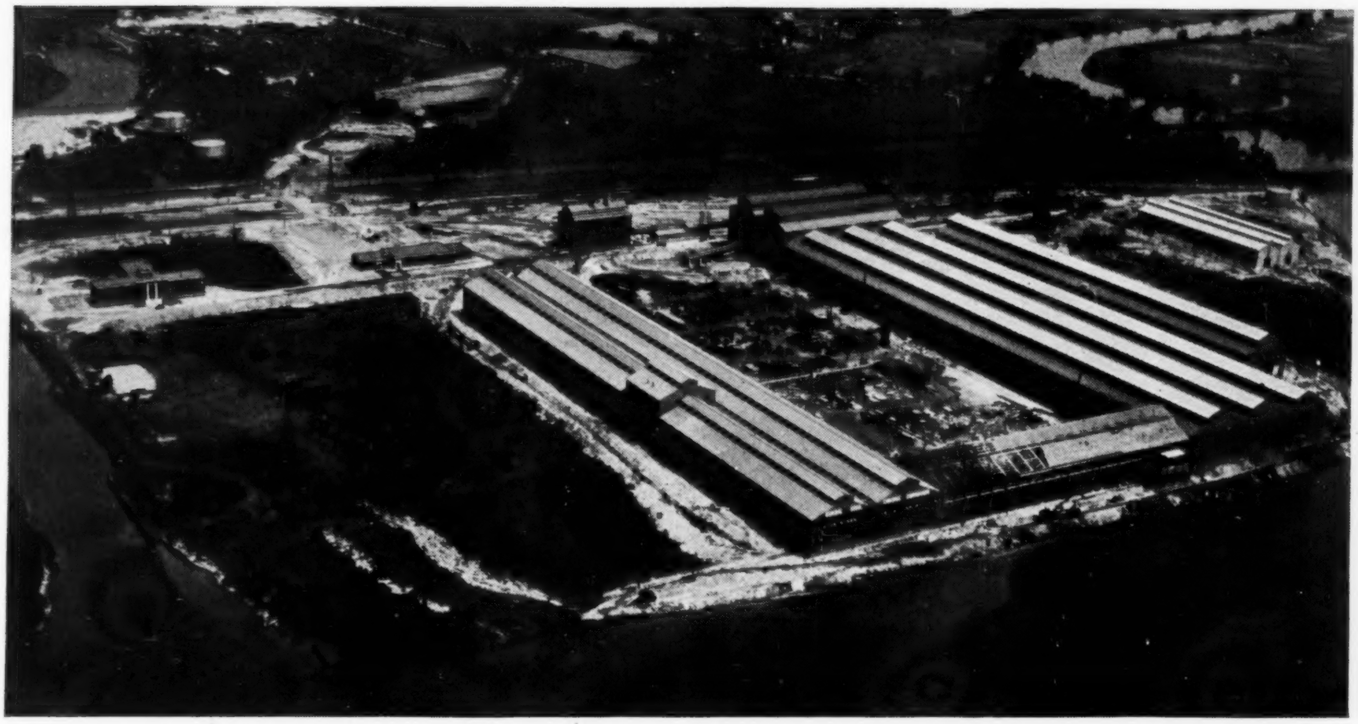


General View of the New Eddystone, Pa., Plant of the General Steel Castings Corporation

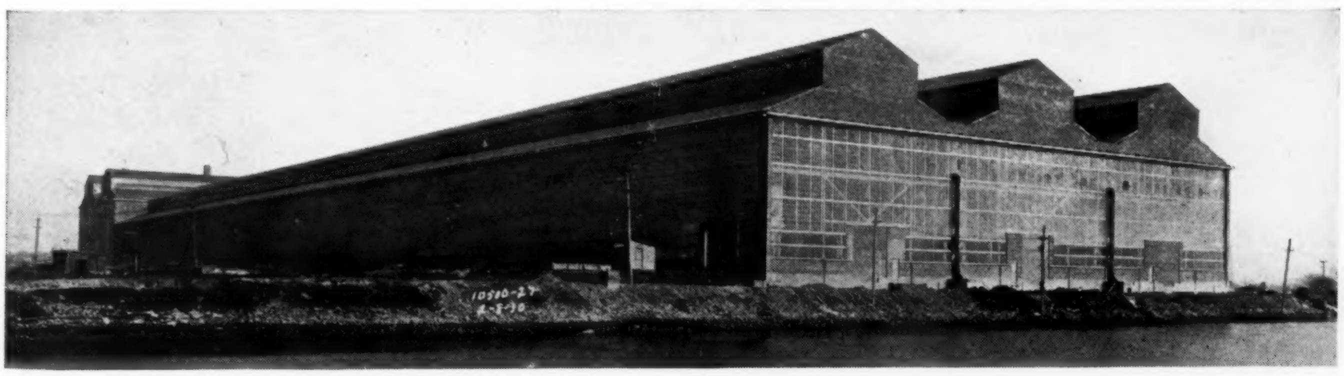
General Steel Castings Corporation Completes Eastern Plant

Plant near Atlantic City with annual capacity of 60,000 tons provides for entrance of large steel castings into new fields

THE General Steel Castings Corporation has just completed a $13,000,000 plant at Eddystone, Pa., which will be ready for operation about July 1 and will pour its first casting soon after that date. Those attending the convention at Atlantic City who wish to stop off at Philadelphia, on their way home, for a visit to the new plant, will be accorded every facility for a complete inspection of it.

This plant with an annual capacity of 72,000 tons of finished castings, will be the second largest of the corporation's four plants. The plant of the Commonwealth division at Granite City, Ill., with an annual capacity of 80,000 tons, is the largest. The remaining plants—the Seaboard and Thurlow plants at Chester, Pa., have yearly capacities of 30,000 tons and 20,000 tons, respectively. When in full operation, the Eddystone plant will employ between three and four thousand men.

The location of the new eastern plant has been selected because of its strategic advantages for serving the locomotive builders in the production of such castings as locomotive beds and water-bottom tender frames which have come to the generally specified orders for new motive power. In addition to the opportunity it offers for taking care of the increasing demand for these large



The Foundry Building before the Construction of the Product Transfer Building

The Charging Platform of the Open-Hearth Furnaces

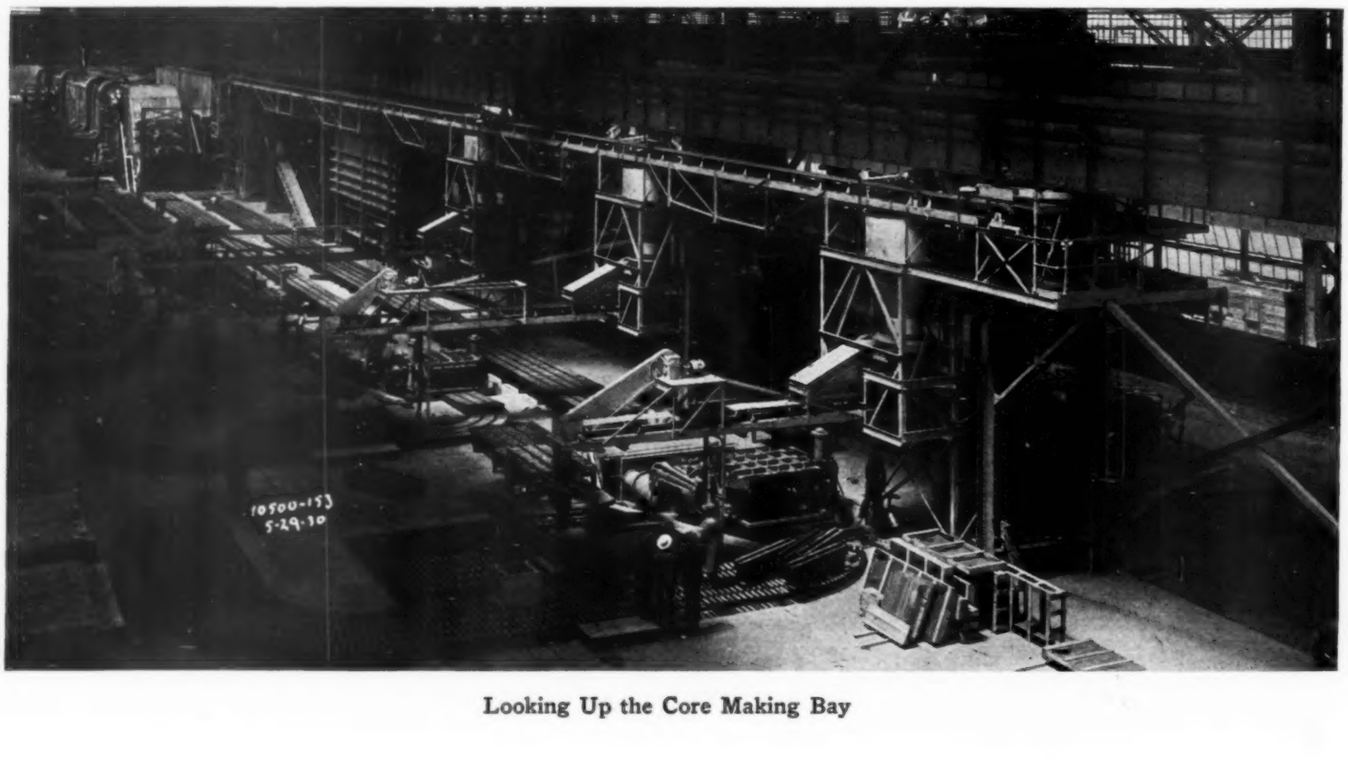
locomotive castings, it provides facilities for a more rapid development of large steel castings in freight and passenger construction and for the extension of large steel castings in the design of equipment other than that used by the railroads.

The new plant occupies a site of 112 acres adjacent to the plant of the Baldwin Locomotive Works at Eddystone and has an extensive water frontage on the Delaware river. In the design of the plant the possible need for extensive future development has been kept clearly in mind. The layout has been so arranged that two additional units, each with a capacity equal to that of the present plant, may be added without in any way disturbing the layout or functioning of the present plant and fully co-ordinated with it in relation to the utilization of the supplementary facilities such as stock piles, power plants, annealing furnaces, etc.

The Foundry

The foundry occupies a building 1,200 ft. long by 275 ft. wide. Across one end of this building, adjacent to the material storage yard, are the furnace and ladle pits, the former occupied by three oil-fired 50-ton basic open-hearth furnaces. The ladle bay is served by a 75-ton crane which handles the ladles transversely to points under the extended ways of the two pouring pit bays. The foundry proper occupies about 1,000 ft. in the length of the building and is divided into three 90-ft. bays. The pouring pits are located in the two outside bays, and facilities for core making, drying, sorting and assembling occupy the center bay. The pouring-pit bays are served by two 75-ton cranes at the furnace end of the building and by two 40-ton cranes at the end of the building toward the shake-out pits. Two 10-ton wall gantry cranes travel over the pouring pits in each bay, and under these are several similar floor-operated light wall gantries for use in core placing, etc. In one of the pouring-pit bays is a mold-drying oven for use in the production of miscellaneous castings for which sufficient production is not available to justify the use of the complete dry core process of molding. The castings are moved from the pouring pits down the bays to the shake-out pits, in which the sand is collected and removed by conveyor.

The product machine shop is parallel to the foundry building and separated by as sufficient distance to permit another complete three-furnace foundry unit to be erected between them, with a clear space of 90 ft. separating the new unit from each of the two existing units. The ends of the foundry and product machine shop are connected by the product transfer building which is 160 ft. wide and which contains a 70-ft. double car-bottom annealing furnace, the end doors of which are 13 ft. wide by 10 ft. high. This building also contains sand blast facilities for cleaning the castings and when com-



Looking Up the Core Making Bay

Arrangement of Tools in the Product Machine Shop

pletely equipped, will contain an installation of one 50-ton and one 10-ton scale for weighing castings before they finally pass through into the product machine shop.

Core Making Facilities

Sand enters the plant in cars on a track which passes through the building in the ladle bay, from which it is unloaded by crane into a storage bin. The foundry is completely equipped with a system of conveyors for moving molding sand and clay from the furnace end of the building to the storage bins, sand mills and core-molding machines and from the shake-out pits through the core breaker back to the bins for further use. The materials in this part of the plant are mechanically handled throughout, and in attaining this objective several unusul methods have been developed.

The breaking-up of cores without the expenditure of a considerable amount of labor has always presented difficulties, because of the presence of metal gaggers and reinforcing pieces in the sand. The core breaker, by which the cores are completely broken up and the metal mechanically separated from the sand, forms a part of the equipment of this plant. This device is, in effect, an inclined tumbler barrel 26 ft. wide by 12 ft. in diameter. A portion of the revolving cylinder at the outlet end is made up of perforated plate through which the sand is screened out and over which all metal pieces pass, dropping out through a chute at the lower end of the cylinder. An ingenious measure has been developed to remove dust and fines from the core sand passing through the breaker, by which the grade of the reclaimed sand as to fineness may be controlled. A large section of suction pipe from one of the dust collector systems extends into the tumbler barrel on its axis from the outlet end for about half its length. The lower half of the circumference of this intake pipe is perforated and the dust in the breaker system is thus drawn out of the breaker. By regulating the vacuum in the suction pipe complete control is effected over the fineness of the sand which ultimately leaves the breaker to be conveyed back to the bins at the sand mills. Furthermore, no dust escapes into the atmosphere of the foundry.

The core oven is 230 ft. long and is designed to dry 800 tons of cores in twenty-four hours. Cores pass through the oven continuously in five tiers, the rate of feed in each tier being independently controlled, depending on the time required for cores of varying volume.

An interesting system for removing dust from the atmosphere over the shake-out pits has been developed in the new plant. The shake-out pit in each bay is divided into two units, one of which may be covered by a movable metal housing, which is carried on rails parallel to the pit. A permanent metal wall encloses the housing at the division between the two units and a removable wall encloses the opposite end. Provision is thus made for moving the housing from one unit of the pit to the other and while castings are being shaken out in one unit the other may be loaded by the cranes. Suction intakes to these two pits lead to the dust collector housing which adjoins the side of the foundry building at this location. An interesting detail in connection with the dust collecting systems is the complete elimination of dirt about the dust collectors. In removing the accumulated dust from the collectors the dust passes into a pipe below the ground level through which it is flushed and disposed of by draining into the river.

The Product Machine Shop

The product machine shop is housed in a building 990 ft. long by 192 ft. wide, which is divided into two bays. This building houses the straightening presses; floor plates; and the heavy planing, slotting, milling, drilling and cylinder and valve chamber boring machines employed in the finishing of the steel castings.

Five of the machines in this plant are equipped with working tables 60 ft. long which will clear 146 in. in width between the housings with 120 in. in height under the rail. During the finishing process large castings move up this building and when finished are weighed and prepared for shipping. It is thus evident that through all the processes in the plant the product has moved continuously forward toward the end of the foundry building on the river, through the product transfer building across to the product machine shop and, passing through this building, has returned to the end adjoining the railroad yard facilities from whence it is shipped.

The Service Building

Adjoining the foundry is a service building 765 ft. long and 90 ft. wide. This contains storerooms, a transformer room and the compressor room, in which are located air compressors and the motor generator units for the distribution of the electric power to the foundry. It also contains the complete switchboard for the control of all circuits throughout the plant, including the

remote control of a motor-generator station in the product machine-shop building.

The remainder of the building—about 495 ft. of its length—is occupied by the pattern shop and machine repair shop. An interesting feature of the pattern shop is the use of a road-specification macadam floor. This was used in lieu of a light concrete floor, because of the possibility of some settlement of the fill, which might lead to cracking of the concrete, and it has been found to provide an excellent working surface, being much less fatiguing for the men employed in this shop than would be the harder concrete surface.

The Character of the Buildings

The buildings are of concrete, brick and steel construction with the enlarged part of the walls and the monitor roofs glass enclosed. The brick walls extend about 6 ft. above the floor level and the glass-enclosed portion of the walls extends from this point 44 ft. up to the roof truss line. Ventilation is provided by two 4-ft. rows of hinged metal sash above the brick walls, by hinged sash in the monitor walls, and by ventilator sash at intervals at the crane rail height. With the unusual care which has been taken for the removal of dust in the foundry it offers unusually agreeable working conditions.

Field for Large Castings Expanding

During the past thirty years since cast steel became a well-recognized material in the construction of railway equipment the growth of its application has been rapid. Beginning with such parts as wheel centers, trucks, bolsters and side frames, combined platform and bolster castings for passenger cars, and locomotive frames, its use has now developed to include the locomotive bed castings—of some of which the cylinders form an integral part—and water bottom tender frames. With modern dry-sand core molding there seems to be no limitation imposed by foundry practice on the size or the distribution of the metal in complicated arrangements of parts, except such as is imposed by the capacity of the facilities available.

The beginning of the use of the cast-steel underframe in car construction has already been made. · Several hundred ore cars with underframes of this type have now been in service for several years. Such underframes have also been used in the construction of 300 gondola cars for sulphur loading, some of which have been in service for four years. The car underframe offers possibilities for the application of quantity production methods in the steel foundry such as are applicable in the case of such parts as truck frames and bolsters.

The adaptation of the water bottom frame principle to tank-car construction is another development in the railway equipment field which has just seen its inception. Designs also have been developed for a 70-ton hopper-car underframe, in which the entire hopper construction below the sill line is included in the underframe casting.

The casting size and tonnage capacity of the new plant has not been provided to meet the demands of developments in railway equipment design alone. It opens up such fields as that of large Diesel engine castings, ship castings, large water turbines and other large structures, materials for the construction of some of which have formerly been limited to iron castings or small steel castings, bolted together, and to riveted structures of plate and rolled sections, which may now be cast with economy in one piece of steel. A pouring pit of 90 ft. square has been provided at the Eddystone plant to take care of such requirements.

The plant provides a sufficient reserve of capacity to permit intensive development in these new directions which has never been practicable before. The maximum size of steel castings which may be poured is determined only by the limitations of transportation facilities.

The design and construction of the plant has proceeded under the direction of W. R. Chambers, chief engineer of construction of the corporation.

REGISTRATION

Division V—Mechanical

(*Continued from Page 1548D102*)

Taylor, C. P., E. E., N. & W., Ritz-Carlton
Taylor, H. L., Supr., S. M. & T., B. & O., Runnymede
Temple, L. E., Mech. Engr., I. & G. N., Ambassador
Templeton, W. G., Gen. Mgr., N. C. & St. L., Dennis
Thorpley, J. E., Elec. Engr., Virginian, Marlborough
Thwaites, D. G., Asst. For., P. R. R.
Tipton, A. F., M. M., Southern S., Kentucky
Tonnies, F. W., J. E. E. E., N. Y. C., Traymore
Train, A. H., Spl. Engr., N. Y. C., Haddon Hall
Trapnell, N. M., Asst. Eng., C. & O., Ritz-Carlton
Troutman, G. A., G. F., M. & B. J. R. R., Eastbourne
Upthegrove, Daniel, Pres., St. L.-S. W., Traymore
Usherwood, G. B., Genl. Bl. Supvr., N. Y. C., Haddon Hall
Wagar, S. J., Eng. of Tests, C. & O., Knickerbocker
Walden, F. F., M. M., S., Kentucky
Waring, F. M., Eng. Tests, P. R. R., Haddon Hall
Warthen, H. J., S. M. P., R. F. & P. R. R., Marlboro
Warthen, J. O., M. M., D. & W.
Waterfield, D. B., Shop Eng., C. & O., Ritz-Carlton
Weatherford, F. A., M. M., S. A. L., Shelburne
Weber, Walter W., Asst. For., Reading, Windemere
Webster, John M., Shop Supt., M., K. & T., B4, De Ville
Weiffenbach, N. E., Shop Supt., W. & L. E., Traymore
Weightman, J. J., C. C. to S. M. P., Reading, Dennis
Werts, James R., Jr., For., M. D., Reading, Elberon
Whamond, A. D., Draft., P. R. R.
Whanger, E. M., Spl. Rep. V. P., P. M., Seaside
Whiteley, G., A. S. M. P., C. P., Ritz
Wickers, Frank L., Ch. Mtl. I., S. A. L., Ritz
Willson, L. M., Chief Insp. Elec., Penna.
Wilson, A. R., Engr., B. & B., P. R. R., Haddon Hall
Wilson, Arthur, Elect., Wiltshire
Wilson, H. A., Sec. to C. M. P., Penna.
Wilson, J. E., F. C. D., N. Y. C., Pennhurst
Wilson, W. H., Draft., B. & O., Kentucky
Winters, J. D., Gen. For. Power and Elect., B. & O., Jefferson
Winters, W. E., Pipe Fitter, P. R. R., Louella
Withraw, L. W., C. M. I., C. & O., Traymore
Witmer, Frank, Asst. For., P. R. R., New Richmond
Worden, W. E., F., S., Elberon
Wray, R. W., Supt. M. P., P. R. R., Haddon Hall
Wright, George I., Engr. E. Tr., Reading
Wynn, F. S., Vice Pres., S., Brighton
Yamawaki, H., Asst. Secy. to V. M., Japanese Govt. Ry., Chelsea
Yonny, J. Jr., M. M. P. R. R., Strand
Yost, R. C., For., P. R. R., Jefferson
Youngman, W. E., G. E. I., B. & O.
Zellers, Robt. M., Asst. Chemist, Reading
Zimkosowski, Frank, Supr. Equip. Light., New Haven
Zimmerman, Harry R., Asst. For., Reading, Pasadena

Division VI—Purchases and Stores

Brown, W. G., Supv. Mat., B. & O., Kentucky
Fried, Geo. J., Storekeeper, Reading
Geraci, F., Secy. to P. A., N. Y. C., Shelburne
Gowland, S. I., A. G. S. K., Penna.
Harris, C. M., Mgr. Tran., Phila. Elec. Co.
Hemmig, Benton L., Time Kpr., Reading, Penn Atlantic
Holzmer, J. F., Pa., N. Y. C., Shelburne
Hughes, P. E., Req. Marker, P. R. R., Apollo
Keliher, Edward, C. C., Reading, Princess
Merryman, Geo. R., G. F. P. & S., C. R. R. N. J., Commodore
Nelson, A. R., Genl. Clk., A. T. & S. F.
Peters, A. J., S. K., J. G. Brill Co.
Reigel, H. H., Asst. P A., J. G. Brill

Motor Transport

Brine, Godfrey, F., Erie
Eldred, Arthur P., Agr. Agt., Reading
Fraser, E. J., Supt. of Auto Equip., U. R. & E. Co.
Robb, George, Clk., Penna.
Wakelan, James P., E. T., P. R. T.

(*Continued on Page 1458D110*)

R. G. Gage
First Vice-President

J. C. McElree
President

J. A. Andreucetti
Secretary and Treasurer

Electrical Men Hold Semi-Annual Convention

Ten progress reports of A. R. E. E. committees presented and discussed at well attended meeting at the Hotel Dennis

THE semi-annual convention of the Association of Railway Electrical Engineers was held on Monday morning at the Hotel Dennis. J. C. McElree, electrical engineer of the Missouri Pacific, and president of the association, called the meeting to order at 9:25, omitting the formality of an opening address.

Ten reports were presented, the first of which was that of the committee on train lighting.

Train Lighting

The report on train lighting was read by the committee chairman, P. J. Callahan, supervisor of car and locomotive electric lighting, Boston & Maine.

The report was one of the longest presented. Among the subjects considered were electric power for refrigeration in dining, club and business cars, development of axle generator transmission, automotive car lighting, standardization of battery capacity rating, and the development of locomotive train lighting.

There is apparently steadily increasing interest in electric refrigeration although the types of equipment used vary widely. The largest use of these cars on one road was credited to the New York, New Haven & Hartford, which is operating ten dining between New York and Boston. Eighteen cars are in service throughout the country, and four other roads, at present without them, are contemplating the purchase of one car each.

With the steadily increasing demand for electrical energy on rolling stock, interest in various types of positive drives for axle generators is likewise increasing. About 30 gear drives and 100 chain drives are in service. Those in service at the time of the last annual meeting have been reported as being reasonably satisfactory. The committee listed nine points to be avoided in the design of positive drives for axle generators, as well as six items which should be included.

The subject of automotive car lighting is being handled by sub-committees of both the train lighting committee and the automotive railway equipment committee and will be reported on at the annual meeting.

A specification for the standardization of battery capacity rating was presented by the committee for consideration and comments.

The application of locomotive electric lighting has continued principally among railroads previously equipped which are adding to their original installation. Two additional roads, however, were reported as having entered this field of car lighting. It was pointed out that one installation having a 20 kw. turbo-generator mounted on the tender was installed at a considerably lower cost than would have been possible had the set been placed on the boiler.

Discussion: A great deal of the discussion dealt with the subject of electrically refrigerated cars and much of this was carried on by representatives of the New York, New Haven & Hartford, which road has recently installed ten cars of this type. H. A. Coppell, foreman electrician of the New Haven at Boston, pointed out

P. J. Callahan

F. J. Hill

some of the difficulties which had recently been encountered with this equipment. During the cooler months the cars had given no trouble but with the coming of warm weather the temperature in the boxes housing the compressors became excessive and it was necessary to cut large holes in the boxes in order to increase the ventilation. Mr. Coppell also reported a few small leaks of gas which had spoiled some of the food.

Regarding the matter of ventilation of the compressor boxes both J. A. Andreucetti, electrical engineer, Chicago & North Western, and A. E. Voigt, car lighting engineer, Atchison, Topeka & Santa Fe, stated that they had had similar troubles and had overcome them by using ventilating louvres which could be closed during the winter months.

The importance of closely watching the state of battery charge was emphasized as one of the vital factors to be considered in the maintenance of these cars. Facilities for battery charging must be provided at points where cars lie over for periods of several hours.

Mr. Ragdale of the Carrier Engineering Company, manufacturers of equipment for air conditioning, gave a short talk on the problems to be met in the air conditioning of cars. He pointed out that the moisture content of the air was a most important factor and had to be regulated according to the time of year.

Locomotive Electrical Equipment

The report of the committee on locomotive electrical equipment was briefly outlined by the chairman, F. J. Hill, chief electrician, Michigan Central.

Although the report was one of the longest presented most of the subjects assigned to the committee were not reported on. The greater part of the report was divided into a discussion of pyrometers as used on locomotives and the fusing of locomotive circuits. Fusing practice appears to differ widely on different roads. The committee reported that three different roads had made test installations of wire purchased under the A. R. E. E. specifications for insulated copper wire for steam locomotives. Twenty-one locomotives have been equipped. The other subjects upon which no report was presented were train control, cab illumination, electro-chemical polarization for preventing corrosion of boilers and electric lubricators.

G. T. Johnson

F. H. Williams

Discussion. L. S. Billau, assistant electrical engineer, Baltimore & Ohio, called attention to the feasibility of the pre-focused lamp for headlight use. He pointed out that the problem was not in the development of the lamp but in the design of a suitable socket and headlight case. This latter phase of the subject, he said, came within the province of the committee on locomotive electrical equipment, while the lamp itself was a subject for consideration by the committee on illumination.

Electric lubrication was touched upon by Mr. Voigt who asked if it were not withn the province of the committee to broaden this particular subject so as to include mechanical lubrication. He said he had experimented to some extent and had found the mechanical lubricator to be simpler.

In reply to this Mr. Billau stated that there are constantly various electrical devices being developed for use on locomotives and that it was within the scope of the subject to keep in touch with these developments.

Purchase of Electrical Energy

For a number of years the purchase of electrical energy has been a subject that has been one of increasing interest to railway electrical engineers. Much of the discussion on this topic has dealt with the matter of contracts between the power companies and the railroads, and after studying various rates and contracts the committee presented as its progress report a proposed form of standard agreement for the purchase of electrical energy.

Discussion. The discussion indicated that the universal adoption of a single form of contract between railroads and power companies was as far from realization as ever. The great variety of conditions encountered and the large number of unaffiliated power companies to be dealt with apparently makes a standard contract unpracticable, at least for many years to come. It was pointed out, however, that there were certain items entering into such contracts that might well be studied. These salient factors should be set down as a guidance to those who have not made a particular study of them.

Electric Welding and Heating

The committee on electric welding and heating presented a brief report in which it stated that considerable data had been collected concerning the nitridizing of steel parts for locomotives and cars. This data, together with the latest development in electric welding of safe ends for boiler tubes, it was stated, will be included in the report of the committee at the fall meeting of the association. In the absence of F. H. Williams, assistant test engineer, Canadian National, and chairman of the committee, the report was read by Mr. Andreucetti.

There was no discussion.

Welding Equipment

The committee on electric welding equipment reported that it had been studying methods of installation and application of welding aparatus, the relative advantages of portable and stationary welding units and individual vs. multiple-unit equipment for furnishing welding current. Gas-engine driven welding generators have also

been considered and the possibility of using the steel work of buildings for a return circuit has been studied. The committee expressied a desire for discussion upon the following question: Is it the desire of the Association that this committee prepare specification covering welding equipment or shall the Association adopt specifications now existing as used by the National Electrical Manufacturers Association?

Discussion: Mr. Billau pointed out that since railroads were only one of the users of welding equipment general specifications for such equipment might tend to confuse rather than to clarify the issue. J. R. Sloan, Chief Electrician, Pennsylvania Railroad, suggested that it would be better to take specifications already in use and change such points as might be objected to rather than to write new specifications.

J. C. McElree

L. S. Billau

Illumination

Mr. Billau, chairman of the committee on illumination briefly outlined the subjects which will appear in the annual report. Among these are a revision of standard incandescent lamp schedules and a revision of specification for incandescent lamps with a view of putting the specification in form for final adoption by the association. Floodlighting as applied to railroad yards was designated as a subject to be continued and the feasibility of using a series system of power supply distribution for floodlighting will be studied.

The committee also proposes to investigate the feasibility of using pre-focus lamps for locomotive headlights. It was stated that the development of this type of lamp is entirely practical but that its successful use depends upon the development of a receptacle which can be satisfactorily and easily substituted for the present standard receptacle. The development of a practical method for mounting locomotive headlights using this type of lamp so that it may be readily adjusted to throw the beam parallel with the track and the need for the lamp itself, owing to its probable higher cost, were phases of the subject which the committee felt should first be developed by the committee on Locomotive Electrical Equipment.

Discussion: E. W. Jansen, electrical engineer, Illinois Central, mentioned the satisfactory service which he had had with a new type of headlight lamp. The new lamp known as the C-4 is a 250-watt lamp. Some of them, Mr. Jansen said, he had in service for 90 days. R. W. Cost of the Westinghouse Lamp Company, in speaking of this lamp, said that it was still in the experimental stage and that it had been developed in an effort to improve the present type of headlight lamp. He also said the only way the lamp companies could find out how satisfactory this lamp was, was to get the reactions from those who used them, and that sometimes the first reports were not conclusive.

Automotive Railway Equipment

In view of relatively recent development in automotive railway equipment, the committee on this subject felt that the adoption of standardization of automotive equipment should be held in abeyance for at least another year and requested discussion on roller bearings versus friction bearings, battery ignition versus high tension magnetos and the advisability of the committee delving into engine construction details. Opinions were requested on the subjects of maintenance of gas- and oil-electric motor cars. Three different types of lighting systems were briefly described and it was stated that the sub-committee planned to follow up the operation of these and arrive at a conclusion as to which is the best practice.

In the absence of E. F. Weber, supervisor automotive service, Chicago, Burlington and Quincy, and chairman of the committee, the report was presented by J. E. Kilker, shop production engineer, Missouri Pacific.

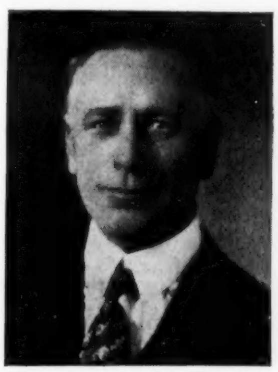
Discussion. Mr. Billau said that since this subject was receiving more and more attention from the Motor Transport Division of the A. R. A., it would be well to find out which branches of the subject would come under the jurisdiction of the A. R. A. in order to avoid overlapping. Mr. McElree said that the question of bearings would probably be one problem to be handled by A. R. A. committees.

Radio

Geo. W. Bebout, electrical engineer, Chesapeake & Ohio, and chairman of the committee on the application of radio to railroad service presented the report on this radio for railway service. He outlined the situation regarding the use of radio communication for freight trains and hump yard service All work of this nature has been held up by the Federal Radio Commission. Apparently this has been due to the fear that such applications to railroad equipment would interfere with police radio. Nevertheless application blanks have been prepared by the Commission for the use of the railroads, and while the Commission could not promise anything, the submitting of these blanks was taken by the committee as an indication the Commission would look more favorably upon the application of the railroads for this service.

Discussion: The question of departmental jurisdiction regarding radio equipment was raised by Mr. Hill. Mr. Andreucetti cited the instance of the Chicago &

E. F. Weber



G. W. Bebout

E. Marshall

C. G. Winslow

Northwestern where 14 or 15 trains are equipped with receiving sets for entertainment of passengers. These installations are maintained by the mechanical department, Mr. Billau stated that there was a distinct difference between receiving sets and transmitting equipment. Referring to the receiving sets for passenger equipment he said he felt that the subject should be kept alive for the benefit that would be derived from a knowlledge of the best methods of installation. By agreement the majority of the eastern roads have not installed receiving sets but on special trains it has been used occasionally and a knowledge of the best practices would be advantageous to those who might have charge of such installations.

Power Plants

In the absence of E. Marshall, assistant electrical engineer, Great Northern, the report of the committee on power plants was read by Mr. Andreucetti. The committee reported that it was making studies of the characteristics of coals of the United States most used in power plants to the end that suitable apparatus may be selected for available coals and that fuels may be selected best suited to existing types of grates, stokers and furnaces. The committee is also making studies of various types of engines and several typical plants are being analyzed to show the economies obtained. A survey of the various indicating, recording and intergrating instruments is being made and a statement is being prepared showing the underlying principles of these instruments. Studies of the operating troubles of internal combustion engines, especially the Diesel, are being made, to the end that their limitations may be noted.

There was no discussion.

Motors and Control

The progress report of the committee on motors and control consisted chiefly of a list of the projects which the committee has under consideration accompanied with the hope that beneficial discussion would be given them. The work of the committee is being carried on by two sub-committees. Sub-committee A is charged with the responsibility of keeping up-to-date the recommendations of motors and controls for several types of machines already reported on, and of investigating of application of motors and control to additional types of railroad machines. This sub-committee is studying the economies of power factor correction, and the limiting features of across-the-line starting of motors. It is also preparing a number of tables for the manual. Sub-committee B is making a study of motor maintenance and test, and of high-frequency motors on portable tools. This sub-committee is also keeping motor specifications up-to-date. Information concerning devices which will keep the oil level constantly was also sought. In the absence of C. G. Winslow, assistant electrical engineer, Michigan Central, chairman of the committee, the report was presented by G. O. Moores, engineer of construction, Baltimore & Ohio.

Discussion: The only subject discussed was that pertaining to constant oil level. Mr. Sloan described a device that the Pennsylvania was using satisfactorily at a number of isolated pumping plants.

REGISTRATION

(*Continued from Page 1548D106*)

Special Guests

Andus, J. R., Steno., P. R. R.
Bailey, Geo. P., Est. V. D., Reading, Shelburne
Baldo, Theo., For. Painter, P. R. T., President
Baker, Ralph M., Mach., P. R. R.
Balsam, S. M., For., B. & O., Kentucky
Banks, A. M., S. A. I., I. C. C., De Ville
Bastian, C. W., Steno., Penna.
Bates, Horace B., Car Insp., Reading
Beddows, R. H., Ch. Clk., N. Y. C., Marlborough
Campanelli, G., R. H. F., P. R. R., Traymore
Campbell, S. R., Sr., Estmr., Reading
Coffee, B. M., Guest E. E., Erie, Arlington
Cummings, Ralph I., Mach., Penna.
Curley, John J., Secy., Phila. Belt
Davis, H. E., Eng-Son of M. M., F. T. C. Co., Seaside
Doehn, H. H., E., S. A. L.
Dullenkopf, C. F., O. P. Supt., P., B. & N. E.
Dunmire, Rullell L., Mach., P. R. R.
Ehredt, Wm. L., Mach., P. R. R.
Emerick, H. C., Acct., Penna.
Ernest, N. E., Mach., P. R. R.
Evans, W. H., F., Penna., Colton Manor
Faris, C. H., Draft., N. & W., Craig Hall
Fielder, R. E., Asst. Supt., Reading, Ambassador
Figart, J. F., Mach., P. R. R.
Fisher, J. H., Guest of A. M. Darlav, B. & S., Haddon Hall
Fleck, Frank O., Pipe Fitter, Penna.
Forshee, I. C., T. & T. E., Penna.
Forsht, Paul E., C. B., Penna.
Freas, J. C., Mach., Penna. R. R.
Gallagher, R. E., Asst. E. E., L. & N., Ambassador
Gee, N. E., Asst. Engr., P. R. R., DeVille
Geraci, F., Secy. to P. A., N. Y. C., Shelburne
Haines, G. G., Supvr. Tr., P. B. & N. E.
Hamilton, C. H., Res. Rep., So. African Govt. Rys., St. Charles
Hamilton, J. C., Mach., Penna.
Hanson, Harvey R., Spl. Appr., Reading
Harris, Chas. C., Insptr., Penna. R. R.
Hasselblatt, Wit, C. E., Strath Haven
Hauer, Chas. Edward, Son of Asst. S. S., C. & O., Shelburne
Hawman, A. M., Asst. C. C., Reading, Lafayette
Hawman, John E., Spl. Co., Reading
Heller, E. H., Crane Op., P. R. R.
Ingram, Frederick John, Machinist, P. R. R.
Johnson, P. A., Mech. Dept., B. & O.
Kass, Irvin, Son of Supt. C. D., R. I., Dennis
Kehler, Ralph Jr., Brady House
Keller, Chas. S., For., Reading, Penn Atlantic
Kemp, Stanley, C. C. to D. M. M., Erie, Morton
Konrad, R. E., Chemist, P. R. R.
Kueck, Edwin, Son M. E., St. L. S. W., Princess
Kueck, Herbert F., Son M. E., St. L. S. W., Princess
Lamb, W. J., S. K., P. & L. E., Brighton
Lanning, Harold, Son of M. E., A. T. & S. F., Haddon Hall
Laudig, J. J., Chem., D. L. & W., Haddon Hall
Lewis, James E., For., Reading
Lieblong, R. W., Elec. Eng., N. Y. C., Traymore
MacCartney, O. D., Inspector, Penna.
Malone, D. C., F. A. B., N. Y. C., K. of C.
Mandius, Edward, Marlboro
Mann, C. W., B. M., Penna. R. R.
Marsh, J. W., Ry. Equip. Engr., U. S. A., Princess
Marshall, Harry F., Asst. Engr., Reading
Maruin, E. O., Dist. Frt. Acct., N. Y. C., Marlboro
McConnel, W. T., Fore. Ret., Penna., Haddon Hall
McConnell, W. T., Fore. Retired, Penna., Haddon Hall
McCormick, Joseph, Tr. Rep., D. L. & W., De Ville
McCurdy, R. M., Head Clk., Penna.
McFarland, W. P., Sec., Penna.
McGarvey, James C., Machinist, Penna.
McManamy, Chas. A., Clk., Penna.
McManus, W. B., Mach., D. L. & W., De Ville
Newbern, R. H., Mgr., Ins. Dept., P.
Palmer, F. B., Clk., P. R. R.
Petrie, E. D., Draft., N. Y. C., Dennis
Pilkington, N. W., Steno., Penna.
Porter, Geo. H., F. E., Reading
Prosser, I. H., Elec., P. R. R.
Ralston, Lawrence, Haddon Hall
Rapine, C. W., For., Reading, Princess
Ray, B. P., Machinist, P. R. R.
Reilly, Jas. A. O., Loco. I., I. C. Co.
Reynolds, D. E., P. A., B. & L. E., Brighton
Robertson, James, Jr., Guest of G. E. Ellis, Marlboro
Robinston, Thos., Pipe Fitter, Penna.

Conventionalities

W. L. Lentz, engineer of motive power of the New York Central, has been called away from the convention by the illness of his daughter.

Frank W. Noxon, secretary of the Railway Business Association, is in Europe and so will miss the conventions this year.

Richard R. Paradies, of the Arco Company, wishes to correct a misunderstanding that exists in the minds of some of his railroad friends. He is not a golf fiend, but does know something about tennis, which, after all, is much more strenuous and better from an exercise standpoint for a man who wants to keep himself in the pink of condition.

William P. Steele, who retired from the head of the service department of the American Locomotive Company a few years ago and who is now living at Madison, N. J., spent several days at the convention with Mrs. Steele.

Harry Oatley of the Superheater Company is giving much of his time now to the multi-pressure steam locomotive which is being designed and built jointly by the New York Central Railroad, the American Locomotive Company and the Superheater Company.

The printer's devil has been getting busy at our print shop in Philadelphia. He recently spelled George Denyven's name with a "W" and Joe Cizek's name all wrong. He has been thoroughly punished and we are sorry for his lapses.

The attractive club coach being shown by the White Company on the boardwalk in front of the Auditorium is receiving considerable attention. This is evidenced by the fact that up to Sunday night it had been inspected by 20,598 people.

The honor of being the youngest registrant goes to Miss Majorie Rhodes, daughter of Lewis B. Rhodes, southern representative of the Vapor Car Heating Company, with headquarters at Washington, D. C. Miss Majorie, whose registration badge is 5116, is three months old.

H. B. Oatley, vice-president, Superheater Company, called our attention to the "Ladies Bride Party" which was featured in the entertainment program in the Monday, June 23, issue of the *Daily Railway Age*. He says it was too bad Mrs. Oatley could not attend the party, but they have been married for 25 years.

Since the opening of the exhibit last week one of the attractions in the booth of the Tuco Products Corporation has been the Tuco Brain Test—a brand new game played with twenty-seven golf balls. The game was developed by Colonel McKay, president of the Standard Coupler Company, and the object is to avoid taking the last golf ball. Until yesterday, Miss Evelyn Bente of the Tuco organization was the world's championship player. Now she is the only woman champion, since she has been defeated by W. B. Clark, president of the Clark Manufacturing Company. It is reported that ever since last Wednesday Mr. Clark has been sitting up nights in his hotel room working on combinations with which to beat the test and apparently he succeeded.

L. W. Baldwin, president of the Missouri Pacific, was a visitor yesterday who gave the exhibit a complete inspection. He was accompanied to Atlantic City by Mrs. Baldwin. He left last night to attend a meeting in New York. Mrs. Baldwin will remain here until the end of the week.

J. H. Nash, Sr., formerly superintendent motive power of the Illinois Central, has just joined the ranks of the supply men and is attending his first convention as a representative of an exhibitor. He has recently been appointed western manager of the Dri-Steam Valve Sales Corporation.

Arthur N. Dugan of the National Bearings Metals Company, has been at the head of the program committee of the New York Railroad Club during the past year and has made an excellent record in putting over programs that have been getting the crowd out and stimulating interest.

Two years ago, William Elmer Jr., son of William E. Elmer, special engineer, Pennsylvania, was awarded the mythical championship for being the tallest man at the conventions. This year we award the championship jointly, to John Clark, superintendent of the car department, New Jersey Central, and to Jos. Sinkler of the Pilot Packing Company, Inc.

Each convention brings forth a small group of former railroad men who have transferred their affiliations to the supply field. One of this group is Carroll Drummond, who up until last December was foreman painter at the Paducah shops of the Illinois Central and is attending this convention as a representative of Devoe & Raynolds Company.

A. I. Lipetz, consulting engineer for the American Locomotive Company and non-resident professor of locomotive design for Purdue University, is being missed from the conventions this year. He is spending the summer studying high pressure steam locomotives in Europe. He attended the recent meeting of the International Railway Congress in Madrid and is now in Austria.

D. B. Parker, Richmond, Va., spent Saturday and Sunday at the conventions. He left Monday morning on the Arrow Limited for Detroit, Mich. Mr. Parker has taken over the sales, in the southeastern territory, of the Smith Multiplex pressure devices which are manufactured by the Clark Manufacturing Company of Philadelphia.

Larry Richardson, chief mechanical officer of the Boston & Maine, is exceedingly enthusiastic over the remarkable spirit and morale which has been engendered in his department by the Supervisors' Clubs. They recently closed their fifth year with a big dinner in Boston. President French, like his predecessors, President Hannauer and President Hustis, takes a real interest in the work of these clubs and honored their joint meeting by a friendly address of 18 words. He said as much in

those 18 words, however, as many men would say in a hundred times as many, and he surely got his personality over to the crowd. Incidentally, as far as we can find, this is the second address that Mr. French has made since he has become president, the total number of words used in both addresses reaching a total of 36 words.

Jerry Blount of the American Locomotive Company, who collaborated closely with T. V. Buckwalter, vice-president of the Timken Roller Bearing Company, in the design of the roller bearing locomotive which is now on exhibition in Atlantic City, is joining with Mrs. Buckwalter in receiving congratulations upon the excellent appearance and performance of that locomotive.

It is hard to tell just what Dave Pye should be credited to, in attempting to describe him, since it is a question whether he gives more time and attention to his job of chairman of the subjects committee of the Central Railway Club, or to his task of finance director of the New York Railroad Club, or to the Tuco Products Corporation. However, since all three of these organizations seem to be in thriving condition, the question can doubtless be left unanswered for the time being.

Eliot Sumner, assistant general superintendent motive power, Pennsylvania Railroad, is nearing the end of his two-year term as president of the New York Railroad Club. The presidents of that club have always taken their jobs seriously, but, even at that, few of them have put so much energy and constructive thought into the task. And, incidentally, Eliot has seen to it that his executive committee has been kept working on the job.

Robert H. Whitelegg, who is attending the conventions as the guest of the Locomotive Firebox Company, was until recently, as already stated in the *Daily*, general manager of the well-known firm of locomotive builders, Beyer, Peacock & Co., Manchester, England, but, as was not stated, he was formerly chief mechanical engineer of the Glasgow & South Western Railway. Mr. Whitelegg is taking over the representation in England of the Locomotive Firebox Company's product, the Nicholson thermic syphon.

E. E. Root, master mechanic of the Delaware, Lackawanna & Western, with headquarters at Kingsland, N. J., brought with him to the conventions this year, Division Superintendent R. M. White. It is the suburban section of Mr. White's division that is now being electrified, the Montclair branch of which will probably be in operation early this fall. Mr. Root reports that the first of the new coaches has been delivered at Kingsland and the electric motors are now being applied.

A. Stucki, president of A. Stucki Company, has recently returned from a trip around the world, on which he was privileged to study the development of railroads in many of the out-of-the-way places. Mr. Stucki sailed from Vancouver, B. C., December 15, 1929, and made his first stop in New Zealand and Tasmania. He next visited South Africa and spent some time in travel over the South African railways, going on many trips far into the interior of the country. He sailed eventually from the Port of Beira for Italy and after a stay of short duration in that country left for his native land of Switzerland. Mr. Stucki embarked at Cherbourg on May 8, 1930, for this country, making the return trip on the new S. S. Europa. He reported that there has been surprising progress made in the development of railroad facilities in those countries and that it is now possible to travel with the greatest of comfort and on frequent schedules.

Jim Partington of the American Locomotive Company has been somewhat embarrassed by the fact that the official enrollment register indicates that he and his wife are occupying widely separated rooms in the Haddon Hall Hotel. We have received assurances, however,—from both Mr. and Mrs. Partington—that they are on the very best of terms and have no intention of separating. Asked where Reno is, one of them said Wyoming and the other Colorado. As Amos and Andy say, this "checks and double checks."

This is W. F. Kiesel IV, now in the early stages of his training for the position of mechanical engineer, Pennsylvania Railroad. He is the son of W. F. Kiesel III, Edison Storage Battery Company, and grandson of W. F. Kiesel, Jr., to whose position he aspires. The Atlantic City roster includes the names of W. F. Kiesel, Jr., Mr. and Mrs. W. F. Kiesel III and W. F. Kiesel IV.

Douglas I. McKay, president of the Standard Coupler Company, comes to the conventions this year in a somewhat new capacity. True, he is still president of his company, but after the death of Harry D. Vought last year, he took over new responsibilities as executive secretary of the New York Railroad Club, at the earnest solicitation of the officers and executive members of that club. Mr. Vought's daughter, Mrs. Hartman, looks after the detail work, Colonel McKay giving attention to the larger matters of policy.

C. A. Seley, consulting engineer of the Locomotive Firebox Company, Chicago, and for many years a member of the Mechanical Division and regular attendant at the conventions, is prevented by other duties from being present this year. Mr. Seley is a familiar figure at meetings of the Mechanical Division, being a frequent contributor to the discussions. One of his most recent interests has been the adaptation of the Thermic syphon principle to marine boilers, a development in which notable progress is being made.

Fred A. Poor, chairman of the Bradford Corporation, arrived yesterday to join President Horace Parker and other officers of that company at the conventions. Mr. Poor has recently returned from Europe where he attended at Madrid, Spain, the International Railway Con-

gress as one of the United States government delegates. Mr. Poor is interested in both the track and mechanical supply fields, being president of Poor & Co., and chairman of the P. & M. Company.

For those who don't know, and there seems to be very few of them, the young lady with the quiet smile that is assisting on the supply men's side of the Registration Booth, is Florence Leonard, secretary to M. A. Smith, superintendent of motive power of the Pittsburgh & Lake Erie. Miss Leonard was born and brought up on the railroad. Her uncle was Dave Redding, of the P. & L. E., and her father and brothers all were at one time connected with the same railroad. This is the second year that Miss Leonard has officiated. She celebrated her birthday last Saturday.

Carl B. Ahlberg, of the Kolomna Locomotive Works, U. S. S. R., and a group of representatives of the Russian railways have been interested visitors at the conventions and exhibit. Mr. Ahlberg's experience has been of an unusual nature. Born in Sweden, he received his technical education in Finland, and at various times in his career was in the employ of the American Locomotive Company, Baldwin Locomotive Works, and The Superheater Company. He is now a locomotive designing engineer in the employ of the Kolomna Locomotive Works.

F. N. Bard, president of the Barco Manufacturing Company, Chicago, and a regular attendant of the conventions in past years, found himself unable to come this year, and the Barco exhibit, accordingly, is in charge of Vice-President Clarence Mellor. Much of Mr. Bard's interest has been centered, during recent months, in a new extension of the Barco plant at Chicago, which combines new facilities for the office force and engineering department, with an extension practically doubling its former capacity.

Benjamin B. Shaw, formerly chief engineer of the Cuba Railroad and subsequently connected with Roberts & Schaefer and with the Argyle Railway Supply Company, joined the railroad sales department of the Wood Conversion Company, effective June 16, and is greeting his friends at the convention in this new capacity. Mr. Shaw is not at all sensitive about his hair which is somewhat "thin" on top, and, in fact, has been ever since his college days when, as "Baldy", he attended the first specialized course in railway civil engineering given by the University of Illinois. Mr. Shaw, or Ben as he prefers to be called, will devote most of his attention during the next few months to demonstrating the advantages of Balsam Wool to railroad men in the Chicago territory.

In compiling the list of members of the Railway Supply Manufacturers' Association who have died during the past two years, and which was read at the R. S. M. A. annual meeting Saturday, the name of George N. Riley, of the National Tube Company, was omitted. Mr. Riley died in Pittsburgh on January 14 of this year, at which time he was probably the oldest living member of the Railway Supply Manufacturers' Association. He was treasurer of the association in 1907-08 and served two terms on the executive committee. In connection with his duties with the National Tube Company he was at one time superintendent of the McKeesport Connecting Railroad.

Mr. and Mrs. George H. Weiler drove down from New York on Saturday to attend the meeting of the metallurgical staff of the Forging Manufacturers' Association. Mr. Weiler, who was formerly with the American Locomotive Company, is now secretary-manager of the Forging Manufacturers' Association, which has offices in the Grand Central Terminal, New York. The Weilers were accompanied by Mrs. A. S. Lewis, who expects to spend the rest of the time at the convention with Mr. Lewis, of the Barco Manufacturing Company.

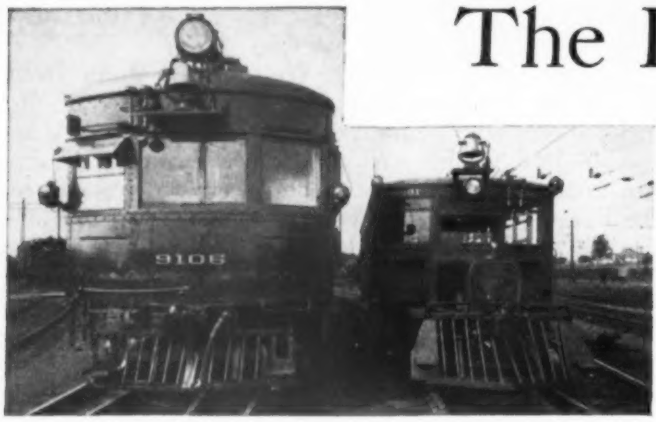
Frank Snyder, vice-president and general manager of the Bessemer & Lake Erie, and Guy M. Gray, superintendent of motive power, head an imposing delegation to the conventions this year. Bill (W. M.) Johnson, general superintendent of the Bessemer, is attending his first convention, as is also C. R. Rosenberg of the mechanical engineering department. Others in the delegation are Mrs. Snyder, Mrs. Gray, Mr. and Mrs. C. L. Tuttle, Mr. and Mrs. Roy C. Beaver, F. W. Dickinson, Mr. and Mrs. D. E. Reynolds, Tom Dickinson, and Jim (J. K.) Booth. Mr. Rosenberg is accompanied by Mrs. Rosenberg, who is also attending her first convention.

C. E. Barba, mechanical engineer of the Boston & Maine, and Mrs. Barba, celebrated their twenty-sixth wedding anniversary at Atlantic City on Sunday. Mr. Barba was in Chicago on Saturday and wired Mrs. Barba to meet him at North Philadelphia, their trains arriving nine minutes apart, and they were just able to make connections with the Sea Gull. Mr. Barba had a most interesting experience last year in visiting Europe and studying locomotive and rolling stock design and operation. His observation on that question to the Supervisors' Clubs of the Boston & Maine this past year was among the high spots in their programs.

Ralph Brown, chairman of the Transportation Committee, wishes to express his appreciation to each member of that committee for the splendid support and hearty way in which they have performed their assignments. He especially appreciates, also, the gift of a pair of silver candelabra in honor of his services as chairman. "The candlesticks," said Mr. Brown, "will be before me each evening I am at home for dinner and will prove to be a gentle reminder of many happy days that I have served as a member of various committees since my first visit to the Saratoga Springs meeting in 1900."

* * *

On the Central of New Jersey



The Old and the New

The Fourth Mechanical Division Session

Address by Commissioner McManamy introduces second half of convention, devoted to consideration of locomotive subjects

IN one of the most interesting and best received addresses of the convention, Hon. Frank McManamy, chairman of the Interstate Commerce Commission, opened Monday morning's session with an earnest plea for the continuation of the spirit of co-operation and mutual helpfulness which is a notable feature of the present relations between the commission and railroad mechanical departments. He said that these relations are more harmonious than those which sometimes exist between different departments on the same railroad.

Mr. McManamy painted a hopeful picture of the future of steam railroad transportation and said that he sees no reason to fear the present competition of other modes of transportation, unless the railroads dissipate their resources and earnings in attempting to regain traffic more economically handled by other agencies. The commissioner also paid a high tribute to the Railway Supply Manufacturers' Association which, in spite of present business conditions, has made available to railroad men the largest and finest exhibition of railway equipment and supplies of its kind in the world.

Following the commissioner's address, the division proceeded with its usual program of committee reports.

Address of the Hon. Frank McManamy

I. C. C. chairman believes railroads will remain supreme in the transportation field

Frank McManamy

It is more than a pleasure to me to respond to the invitation of your chairman to speak at this session. It is a duty which I think I owe to this association. Thirty-one years ago I came as a child among you to sit at the feet and hear the words from the lips of the leaders of the mechanical department of the American Railway Association, thereby to obtain knowledge which in future years would be helpful to me in the occupation which I had decided to follow. I found that my time here was well spent, so well in fact that I have continued the practice up to the present day for the purpose of keeping myself informed with respect to the development of railway equipment and in touch with modern railroad practices.

The first meeting of this association which I attended was held at Old Point Comfort, Virginia, in June, 1899. The president of the Master Mechanics Association at that time was Robert Quayle, of the Chicago & Northwestern, and C. H. Schroyer, of the same road, was president of the Master Car Builders Association. I enjoyed the friendship and profited by the counsel of both of those men during the remainder of their lives just as I have enjoyed the friendship and profited by the counsel of each of their successors, including my good friend here, Mr. Smart.

I owe much to this Association and to the men who compose it for the advice, instruction and helpful encouragement which they have so freely given me during all these years. It is a source of extreme gratification to me to be able in part to repay my obligation by coming before you in the capacity of chairman of the Interstate Commerce Commission to extend my congratulations on your past achievements and my best wishes and assurances of sincere co-operation in your future efforts.

There is another reason why I am glad to be here today. To me and I think to you this is more than just another occasion when as chairman of the Interstate Commerce Commission I am called on to make a speech.

As stated by your chairman this is the first time that the chairman of the Interstate Commerce Commission has ever appeared before this association. I feel with your president, Mr. Aishton, that it is a matter of public interest because it illustrates the degree of co-operation which has been developed between the railroads, as represented by this association, and the regulatory authority of the government.

And it is a complete answer to those who have either for pleasure or for profit spent their time promoting or creating dissatisfaction or controversy with respect to the methods of railroad operation and regulation which by years of experience have been developed, and approved by the American people.

The Interstate Commerce Act as originally passed by Congress on February 4, 1887, contained nothing with which this association was directly concerned, as it applied wholly to rates. The Safety Appliance Acts of March 2, 1893, and later acts, however, changed that

and created a situation which made it necessary for the Interstate Commerce Commission representing the Government to establish a direct contact with this association to develop a method of administration which would effectuate the purpose of the Act in the best practical manner at the least possible expense.

As a matter of fact, that was specifically provided for in the law. In the beginning there was, of course, some friction, and occasionally the discussions developed more heat than light. With experience came understanding and knowledge of each other's motives until at the present time the laws relating to the operation of railroads are being administered with a degree of co-operation and effectiveness which equals, if it does not surpass, that between different departments of the same railroad.

I would be ungrateful, indeed, if I did not respond to the very kind expressions of your president, Mr. Aishton, concerning my work on the Interstate Commerce Commission and my efforts to promote closer co-operation between the commission and this organization. In this Mr. Aishton has joined whole-heartedly. About 20 years ago I had reason to call on Mr. Aishton, then president of the Chicago & Northwestern, to lay before him some matters relating to the requirements of the law which apparently were not fully understood by all of the officials on his line. Mr. Aishton's first words to me were that I was the first representative of the government who had sought his co-operation with respect to matters relating to the requirements of the Interstate Commerce Act, and that it was his desire that all such requirements should be strictly observed, and that they would be if the matter was brought to his attention.

I have found that to be his attitude from that day to this, and I do not hesitate to say that our joint efforts have done much towards bringing about splendid and effective co-operation in all matters relating to the regulations governing the operations of the railroads, under which has been developed the best and most efficient system of transportation which the world has ever known.

Railroads Should Continue to Dominate Transportation Field

We hear much about the probable future of the railroads and the possibility or even probability of the traffic being largely diverted to other means of transportation. It is always dangerous to attempt to forecast the future, but I see nothing in the present situation that threatens the future supremacy of the railroads in the transportation field. For at least 75 years the railroads had no effective competition. Within the past few years competition within certain limits has developed, but I see in that no occasion for alarm, particularly when that same competition is providing the railroads annually with more than one million carloads of high class traffic which otherwise would not exist, and which is also relieving the railroads of many classes of service which they formerly performed at a loss.

I have an abiding faith in the ability of the railroads as at present managed to meet any competitive situation which may arise providing they do not spend too much of the money that is earned on the rails in acquiring and developing other means of transportation to handle traffic which can be more economically, efficiently and satisfactorily handled by rail.

Like John Paul Jones, the railroads have not yet begun to fight. When they do they will get their share of the traffic, and the public will get service of a character which is now not even dreamed of. I can, perhaps, use the steam locomotive to illustrate what I mean. Every few years some enthusiastic advocate of some other means of generating power appears with a large bouquet of lilies to place on the bier of the steam locomotive. It is but fair to say that there have been wonderful developments along those lines, but in the meantime the steam locomotive, increased in size, power and speed, improved in efficiency and economy continues to depart and arrive on schedule time bearing the burden of the commerce of the country.

I do not mean that the railroads will be able to drive competition from the transportation field, and they should not. They will meet it with comforts, conveniences and service which for distances of more than 50 miles will be almost irresistible, and the public will be vastly benefited thereby.

Mechanical Division Renders Important Service

This is a wonderful convention. Wednesday morning I came into this auditorium with one of the past presidents of this association, and a prominent journalist. When we reached the exhibition hall and saw the magnificent collection of railway appliances assembled there, I was asked this question: "Does it pay?" My reply was that I had reached a decision on that point 11 years ago when it became my duty to determine for the United States Railroad Administration whether or not a meeting of this Association should be held during the period of federal control. I decided then that it did pay, and I have had no occassion since to change my mind.

The potential value is here. Its actual development depends on you. You will get out of it just what you put into it. If you come here solely for a good time, it will not pay either you or your company. If you take advantage of the opportunities here afforded to improve your knowledge of railway appliances and methods it will return substantial dividends to both.

However, we must look further than the question of whether or not it pays. Even if it be decided that it is an expense it may be one that is entirely justifiable. This association is a very essential part of what the United States Supreme Court has termed the national transportation machine. It came into existence to meet a situation which was the inevitable result of the demands of the country for a more complete and efficient system of transportation. When in the interchange of traffic it became necessary for freight cars to leave the rails of their owners and move over other lines, rules and regulations providing for their movement, their use and their return became essential.

One of the first duties of this Association was to provide such rules from which have grown our present rules of interchange and other rules established by this body which if just and reasonable as required by the Interstate Commerce Commission Act are the law. Paragraphs 10 and 11 of Section 1 of the Act makes it the duty of each carrier to establish, observe and enforce just and reasonable rules, regulations and practices with respect to car service. This organization having undertaken the task of establishing such rules for all carriers is therefore a law-making body and it is but fair to say that there have been but few instances in which the Commission has found it necessary to modify or change the rules of interchange which you have established.

There is one thing, however, in which the support of the commission is essential. The more or less voluntary character of your membership makes it somewhat difficult and at times impossible for you to enforce the

observance of established regulations with that degree of uniformity which is such an essential part of their just and reasonable application. Agreements may be reached with respect to proper rules and they may be approved by a majority of your voting membership. However, a dissatisfied minority or an indifferent membership of the majority may, under the national system of railroad operation, render unsatisfactory or even unworkable the best system of rules and regulations that it is possible to devise. The authority therefore to see that the regulations which are established are just and reasonable and that they are applied and observed with fairness and with justness was lodged with the Interstate Commerce Commission. That I think is where it must rest if the rules are to be given their full force and effect.

What I have said has been chiefly applicable to Division V, Mechanical, of the American Railway Association. I will now say a word with respect to the Railway Supply Manufacturers' Association which has done so much to make this meeting both pleasant and profitable to you. The more or less temporary business depression may be affecting the membership of the Supply Manufacturers' Association, but they are not taking it lying down. The magnificent display of railway appliances which they have brought here in part at least for your benefit can be equalled nowhere else on earth, and whether or not you agree with them as to the merits of their various devices, I am sure you will agree that their spirit is worthy of emulation by other industries.

Their constant efforts to bring about improvements in railway equipment and supplies has done much toward making it possible for the railroads to make the remarkable record in service, economy and efficiency which have been frequently referred to in this meeting.

Report on Specifications and Tests for Materials

Revisions on specifications and practice offered. Greater part of report devoted to specifications for lumber

F. M. Waring
Chairman

Your committee submits the following recommendations:

Revision of Standard Specifications

Helical Springs

Table No. 1 giving Test Loads has been found to contain a number of errors, therefore it has been recalculated and checked throughout and the correct figures will be furnished the secretary for printing. The words "Revised 1930" should be added under the title.

Chain

These specifications have been revised as follows:

Sec. 2. Material: Second sentence covering Crane Chain. Requirement for all pig puddled iron removed and the sentence reworded as follows:

"*Crane Chain*—Wrought iron, free from any admixture of iron scrap or steel."

This change is made because the puddling process is not the only one at this time by which satisfactory wrought iron can be made.

Sec. 4. Chemical Composition—Change the maximum phosphorous and sulphur content for steel proof coil chain from .04 to .05 per cent for both.

This change is made because the present requirement of .04 per cent has been found to be unnecessarily restrictive.

Sec. 5. Check Analysis—Par. (b). Change to read as follows:

"Samples for analysis shall be taken from the entire cross-section of the bar."

This is changed for the reason that the present wording may result in securing samples taken largely from the center of the bar and therefore not representative of the entire cross-section.

Revision of Recommended Practice Specifications

Belting, Axle Light

It has been found that the width tolerance is not in accordance with commercial practice and that the limit of 1/16 in. plus or minus is unnecessarily restrictive, therefore it is recommended that Section 13 be changed to read as follows:

"*13. Width*—The width of the belting shall conform to that specified with a tolerance of plus or minus ⅛ in."

Hose, Tender Tank

This committee approves the recommendation of the Committee on Locomotive Design and Construction in their 1929 report, Exhibit E, to include the table of diameter and length of soft ends as new paragraph 18 inserted immediately after present 17. Present paragraphs 18, etc., to be numbered consecutively.

Wrought Iron Bars, Refined

Revised as shown in Exhibit A to require a more ductile grade of iron, free from bought scrap and steel, and to provide an etch test for determining the presence of steel or lack of homogeneity in structure, with the object of providing a better quality of material suitable for severe service, such as for arch bars and column bolts.

Lumber Specifications

A revision of these specifications is shown in Exhibit B and was prepared by representatives of the Car Construction Committee, the Purchases and Stores Division and this committee. It is recommended that this revision be published as information in order to get it before consumers and producers for criticism and, if there are no objections, that it be adopted in 1931 as Recommended Practice.

The present specifications for lumber were adopted in 1910. So for 20 years the recommended practice has remained unchanged, despite developments in car and lumber standards. Revision of the specifications was therefore necessary to harmonize with present commercial practice, and this revision has been based on the American Lumber Standards resulting from co-operative effort by consumers, distributors, and producers under the auspices of the U. S. Department of Commerce.

Since 1910 and particularly during the last 10 years the manufacture of lumber of all species has greatly improved. More efficient sawmill machinery has been brought into use and lumber manufacturers have begun to manufacturing their product as better to fit the exacting requirements of particular uses. Rapid progress has been made in seasoning and grading. Associations of manufacturers and distributors have, through efficiently administered grading bureaus, formulated comprehensive practical rules for lumber inspection, have instituted orderly systems for the policing of grades produced by members, and have thus both raised the standard of grading and established practical uniformity between grades produced by different member mills.

Probably the most important step taken by the lumber industry as a whole has been the formulation, adoption, and now acceptance in current practice, of national standards to govern in the manufacture, grading, and shipment of softwood lumber, known as the American Lumber Standards, sponsored by the Federal Government, and formally published by the Bureau of Standards in the U. S. Department of Commerce (Simplified Practice Recommendation 16).

Specifications for railway car and locomotive lumber recommended 20 years ago were applicable, adequate, and acceptable at that time and for years since; but new information now available and increased knowledge acquired by railway car designers and builders makes the present recommended practice need revision to meet existing conditions.

The specification adopted in 1910, while enumerating the sever-

al kinds of wood used in cars covered classification, grading, and dressing rules for only the principal woods then in greatest use. With the introduction of new species suitable for railroad purposes, your committee believes the recommended practice should be broad enough to provide standards for all woods apt to be used. It therefore recommends master specifications covering all lumber.

The revised specification lists all woods fit for a given purpose, and it is assumed that each road will use the wood most advantageous in its particular locality. The specification has been greatly simplified by the adoption of only two standards grades in regard to quality, thus eliminating misunderstandings and confusion which often resulted when several grades, each varying but slightly, were specified. It also fixes the minimum quality acceptable for each use, and where a higher quality might be considered necessary, this may be obtained by merely reducing the number of defects listed in the grade description to provide the grade desired.

In arrangement, these specifications are similar to existing recommended practice. Section I lists the various woods available and used for car and locomotive lumber, employing for the purpose the lumber industry's adopted standard nomenclature. Section II provides a use classification of the different detailed parts, a key to the kinds of wood used therefor, the group designation under which each wood is graded, and a reference to the paragraph giving the grading rule. Section III contains the provisions which govern grading, inspection, measurement, and shipping of car lumber. Section IV supplies master or composite rules for two standard grades applicable to all species for each part, one grade suitable for new cars and one grade suitable for the repair of old cars. Section V gives the definitions of defects and blemishes in accordance with American Lumber Standards.

Besides bringing the grading of car lumber up to date from manufacturing and use standpoints, the recommended specification, avoids the objectionable features of the present one. Further, all car uses of similar requirements are grouped with respect to grading, thus eliminating repetition in grade description. The grading rules are keyed so that car designers having once decided upon the wood to be used for a certain purpose can readily locate in the specification the manner in which it is graded and the grade to be specified. The grade descriptions now list all defects which are barred, as well as those which are admitted. This will prevent misunderstandings and permit ready comparison between grades. The grades fix a maximum quality acceptable for each use so far as the A. R. A. can standardize the grades of lumber to be used. Some roads will consider the grade proposed low, compared with what they have been using. Some will aim to have several grades, some better, some worse, and some between the two proposed. There is nothing to prevent a road from rewriting a grade description, in accordance with its assumed needs, but, of course, the more that this is done, and the more grades there are, taking the industry as a whole, the greater the confusion, not only among the roads, but among lumber manufacturers, and greater the cost.

In the preparation of this master grading specification, cognizance has been taken of existing car lumber grading rules, those contained in the present recommended practice, those adopted and reprinted by the Southern Pine Association and the National Hardwood Lumber Association, and those published by the West Coast Lumbermen's Association. They incorporate the acceptable features of these existing rules and depart therefrom only where the now better known requirements of car construction demand. With respect to defects and blemishes permissible in each grade, this specification more closely conforms to standard lumber manufacture association grading practice, as prescribed in American Lumber Standards, than any existing standards. Thus the stock from which house and factory flooring are manufactured at the sawmill and the manner in which they are worked to pattern, provide the principal rough material from which car lining, sheathing, roofing, and flooring are produced. Similarly, the specification for car framing and sills is, to the maximum extent possible under the circumstances, in agreement with lumber manufacturers, standard grading practice for dimension lumber and small timbers. These recommendations include also the specifications adopted by the Mechanical Division in 1927 regarding moisture content of car lumber.

The grading section of this specification, being master in character, is sufficiently broad to be inclusive of commercial practice in the varying species. It can, therefore, be considered practical and desirable recommended practice. In its use it should be borne in mind that the equivalent defects listed as admissible cannot all occur in the same kind of wood.

Thus it is possible to have a description which fits any wood because it fits every kind. If pitch is barred or restricted in a specification and the wood under consideration is a non-resinous one in which pitch is never present, that part of the specification simply does not apply. It is not necessary to have a separate specification for each kind of wood, differing from one another in details which interest only those who might desire to maintain grade descriptions as hard to understand as possible. The consumer of car lumber is interested first in the description of the grade (quality) of lumber which will serve his purpose; second, in the availability of the woods he would prefer to use; and, third, in the prices he would pay. The recommended grades are based on the certain requirements of a given use, not on the separation of lumber into groups with characteristic defects. They aim to the selection of lumber suitable for a specific purpose, not on finding uses to which a collection of lumber may be adaptable.

Consideration has been given to the latest changes by consumers and producers in current recommended practice. All such substitute standards are unsatisfactory because their descriptions are not specific and will result in grades not uniform in quality compared with the following recommended standards. The proposed revision lists in each grade for each use every known defect that is permissible, and also specifically enumerates those that are not permissible. The proposed B and better grade definitely provides for only two defects in any unit of surface area. Recent producers' rules list only a few defects and place dependence mainly on "equivalent defects." The producer wording permits a piece with only one defect in it or one with four defects in it to go in the same grade. If a piece with one defect might be considered twice as good as a piece with two defects, the rules referred to will permit pieces from one-half to twice as good as the recommended rules. Such range in quality is too wide. Some producer rules attempt to provide an unnecessary degree of refinement in number of grades for one item, and individual sets of grades for various but similar items. This will not only not supply any more suitable material for a given use, but will only confuse whoever attempts to interpret from the rules the grade he desires to buy and what he will get after he buys it. When numerous grades are provided for a given item, they can vary so slightly that they will not be followed in actual practice. Similar items of the same general grade are apt to come from the same rough kiln dried pile before milling. None of the sets of rules analyzed will yield material of better average quality than those herewith submitted as standard for recommended practice.

The committee therefore feels that the specification as now revised is in general accordance with modern commercial practice and that the simplification arrived at by the adoption of but two standard grades as to quality will greatly facilitate its practical application.

General

Unions and Combination Union Fittings, Black and Galvanized, for 300 lb. Pressure

These specifications were prepared by the Committee on Locomotive Design and Construction in its 1929 report, Exhibit D, and referred to this committee, in the following form, for suggestions:

1. Scope—This specification covers malleable iron and steel pipe unions and combination union fittings for use on locomotives under working pressures up to 300 lb. per sq. in.

I. Manufacture

2. Process—Malleable iron shall be made in accordance with the best commercial practice with respect to composition, melting and annealing. Steel shall be made by the open hearth or electric process. All castings shall be thoroughly annealed. Rolled steel to be used in forgings or manufacture by machining, shall be sound and free from segregation. Nonferrous inserts shall be made of sound, tough brass or bronze. All inserts shall be securely attached to their supporting members.

Galvanized unions shall be thoroughly and smoothly coated with zinc by the hot dipping process.

3. Proof Test—Each individual union shall be tested by the manufacturer, under water, or oil, with air at 150-lb. pressure. No copper or rusting solution, cement or welding will be permitted.

II. Properties and Tests

4. Finished Unions—The weights and strengths of unions shall not be less than those shown in Table I.

Table I

Size of pipe	Minimum weight of union	Tensile Strength: Tightening Moment (ft. lb.)	Tensile Strength: Load at leading
⅛ in.		55	1,600
¼ in.		85	2,600
⅜ in.	(to be	130	3,900
½ in.	added	180	5,400
¾ in.	after	250	7,600
1 in.	samples	360	11,000
1¼ in.	have	530	16,000
1½ in.	been	670	20,000
2 in.	made)	970	29,000
2½ in.		1,400	41,500
3 in.		1,950	58,500

5. Method of Test—In testing the strength of unions, a solid iron or steel bar shall be screwed into one end, and into the other end, a piece of heavy walled tubing or a bored bar which shall be connected to a water

supply having a pressure of 40 lbs. per sq. in. The union nut shall be tightened with a static turning moment of the intensity shown in the table. The air in the hollow bar shall be suitably vented before beginning the test. The assembly shall then be pulled in tension at a crosshead speed of one-half to one inch per minute. The load shall be noted at which the first leak occurs.

If the union leaks before reaching the specified minimum load, the union nut will be tightened as before, and the test repeated, once.

6. Number of Tests—Three unions or union fittings of each size will be tested for each 1000, or less, of each size in each shipment, and one additional for each additional 1000. If any fail to meet the required minimum load, two more will be tested for each one which fails. Both of these shall meet the requirements.

III. Workmanship and Finish

7. Dimensions—Unions shall conform to the limiting dimensions shown on drawings forming a part of this specification.

8. Finish—Surfaces which are to remain in the cast condition shall be reasonably smooth and free from scale, fins, lumps, cracks, cavities and other injurious defects. Machined surfaces shall be smooth and fit properly against the adjoining parts. All parts shall be finished and assembled in a workmanlike manner. All unions shall be well oiled, to prevent rust in transit or storage.

IV. Marking

9. Marking—Unions shall bear maker's name or symbol, the size, the designation 300-lb., and "A. R. A." clearly cast or stamped into the metal.

V. Inspection and Rejection

10. Inspection—Unless otherwise specified by the purchaser, the inspection of unions shall be made at the place of manufacture. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

11. Rejection—Unions which do not fill the requirements of these specifications will be rejected. Unions, which, subsequent to above tests at the works or elsewhere and their acceptance, show any defects shall be rejected and shall be replaced at the expense of the manufacturer.

This Committee suggests the following:

Section 1—Approved.

Section 2—Change first sentence to read: "The malleable iron shall be made in accordance with A. R. A. specifications for Malleable Iron."

Section 3—Approved.

Section 4—Finished Unions—This has a Table I, giving weight (not filled in), tightening moment in pounds and tensile load in pounds at leaking on pulling test. It is recommended that control of weight is secured by control of dimensions shown on the diagrams accompanying the report; that the tightening can be done by an experienced operator without the difficult determination of the moment, and that the load at leaking is so close to the breaking load that the latter test can be substituted with considerable simplification of the process.

Tests of unions have shown that the breaking loads of the smaller sizes are relatively higher than the larger sizes and do not follow the proposed straight line formula. Therefore it is recommended that the following be substituted for the present table.

Table I

Size of pipe, in.	Breaking load, lb.
⅛	5,000
¼	7,000
⅜	9,000
½	11,000
¾	14,000
1	18,000
1¼	23,000
1½	28,000
2	35,000
2½	45,000
3	60,000

Section 5—Method of Test—to be revised to cover the breaking test without pressure, as follows:

"*5. Method of Test*—Solid bars shall be screwed into both ends of union for gripping in tensile machine. The union nut shall be tightened solidly without undue strain. The assembly shall then be pulled at a crosshead speed of not more than ⅛ in. per minute. The load at failure shall be not less than that shown in Table I."

Tests have shown that the original proposed crosshead speed of ½ to 1 in. per minute is entirely too fast to permit proper testing of this material.

Sections 6 to 11 inclusive—Approved.

Diagrams and Tables of Tolerances—These are approved subject to correction of errors with which the Committee on Locomotive Design and Construction is familiar and need not be detailed here, except that it is suggested that the formulas be printed in legible type and that the thickness of collar "R" on union ring be specified as a minimum dimension.

If the above suggestions meet with the approval of the Committee on Locomotive Design and Construction, it is recommended that every effort be made to have these specifications put before the Association for letter ballot this year.

Exhibit A—Specifications for Wrought Iron Bars, Refined

I. Manufacture

1. Process—The finished product shall consist either of new muck bar iron or a mixture of muck bar iron and wrought iron scrap. The term scrap as here used applies only to the manufacturer's own crop ends. No foreign or bought scrap shall be used and the iron shall be free from any admixture of steel.

All bars shall be of the full length of pile.

II. Chemical Properties and Tests

2. Chemical Composition—The iron shall conform to the following requirements as to chemical composition:

Manganese, maximum per cent.................. 0.10

3. Check Analysis—(a) An analysis may be made by the purchaser from specimens used for tension test. The chemical composition thus determined conforms to the requirements specified in Section 2.

(b) Drillings or chips for analysis shall be taken from any specimen.

III. Physical Properties and Tests

4. Tension Tests—(a) The iron shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in.	47,000-53,000
Yield point, min. lb. per sq. in.	0.6 tens. str.
Elongation in 8 in., min. per cent	25

(b) Fracture shall be wholly fibrous.

(c) The yield point shall be determined by the drop of the beam of the testing machine. The speed of the crosshead of the machine shall not exceed ¾ in. per minute.

5. Permissible Variations in Physical Properties—For material over 4 sq. in. in section area the following reductions from the minimum requirements specified in Section 4 (a) shall be made for each square inch of nominal section above 4 square inches.

Tensile strength—250 lb., but not under 45,000 lb. per sq. in.

Elongation—0.5 per cent, but not under 22 per cent.

6. Bend Tests—(a) Cold Bend Tests: The test specimen shall bend cold through 180 deg. around a pin the diameter of which is equal to the diameter or thickness of the specimen, without fracture on the outside of the bent portion.

(b) *Hot Bend Tests*—The test specimen, when heated to a temperature between 1700 and 1800 deg. F., shall withstand being bent through 180 deg. flat on itself without fracture on the outside of the bent portion.

(c) Bend tests may be made by pressure or by blows.

(d) *Nick bend Tests*—The test specimen, when nicked 25 per cent around with a tool having a 60 deg. cutting edge, to a depth of not less than 8 or more than 16 per cent of the diameter or thickness of the specimen, and broken, shall show a wholly fibrous fracture.

7. Etching Test—The cross section of the test piece shall be ground or polished and etched for a sufficient period to develop the structure of the material, which should be uniform, characteristic of wrought iron and free from steel.

8. Test Specimens—(a) Tension and bend test specimens shall be of the full section of material as rolled, if possible. Otherwise the specimens shall be machined from the material as rolled; the axis of the specimen shall be located at any point midway between the center and surface of round bars, or midway between the center and edge of flat bars, and shall be parallel to the axis of the bar.

(b) Etch test specimens shall be of the full section of material as rolled.

9. Number of Tests—(a) All bars of one size will be piled separately Two bars will be selected at random from each 200 or less and tested as specified.

(b) If any test specimen from the bars originally selected to represent a lot of material contains surface defects not visible before testing but visible after testing, of if a tension test specimen breaks outside the middle third of the gage length, the individual bar shall be rejected and one re-test from a different bar will be allowed.

IV. Permissible Variations in Gage

10. Permissible Variations—Round bars shall conform to the standard A. R. A. limit gages, except round bars larger in diameter than those given in the standards of the A. R. A. as well as the width and thickness of flat bars, which may vary not more than 2 per cent above or below that specified.

V. Finish

11. Finish—The bars shall be smoothly rolled and free from slivers, depressions, unwelded seams and evidence of being burnt.

VI. Marking

12. Marking—The bars shall be marked as designated by the purchaser.

VII. Inspection and Rejection

13. Notification—The manufacturer shall notify the purchaser at least five days in advance of the time material will be ready for inspection.

14. Inspection—(a) The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. Rejection—(a) If either of the test bars selected to represent a lot does not conform to the requirements specified in Sections 4, 5 and 6, the lot will be rejected.

(b) Material which, subsequently to the above tests at the mill or elsewhere, and its acceptance, develops weak spots, cracks, or imperfections, or is found to have injurious defects, shall be rejected and the manufacturer notified.

16. Rehearing—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report.

Exhibit B—Specifications for Lumber

[This tentative specification which is submitted for examination and criticism before the 1931 convention is quite fully outlined in the earlier part of the committee report. The specification is divided into the following sections:

1.—Schedule of Lumber—A list and classification of hard and soft woods with standard commercial and botanical names.

2. Use of Classifications—A list of the various detailed car parts ordinarily made from lumber with an enumeration of the kinds of woods and grading groups employed.

3. General Instructions—This covers manufacture, provisions for grading, shipping, inspection, measurements, sizes, patterns and lengths.

4. Grades of Car Lumber—The various grades are defined and shown in tables. Descriptions of grades are given and their application to sheathing, roofing, flooring, framing and other car parts.

5. Definition of Terms—The various terms used and the defects mentioned described and defined in detail.

The full report is so long and complete, and being only tentative, it is not included in this abstract.—Editor]

The report is signed by F. M. Waring (chairman) engineer of tests, Penna.; C. P. Van Gundy, engineer of tests, Baltimore & Ohio; F. Zeleny, engineer of tests, Chicago, Burlington & Quincy; A. H. Fetters, general mechanical engineer, Union Pacific; H. G. Burnham, engineer of tests, Northern Pacific; J. C. Ramage, engineer of tests, Southern; J. H. Gibbony, chemist, Norfolk & Western; F. T. Quinlan, engineer of tests, New York, New Haven & Hartford; T. D. Sedwick, engineer of tests, Chicago, Rock Island & Pacific; A. G. Hoppe, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific; H. W. Faus, engineer of tests, New York Central; H. D. Browne, engineer of tests, Chicago & North Western and E. E. Chapman, engineer of tests, Atchison, Topeka & Santa Fe.

Discussion

A. G. Trumbull (Erie): There are some features of the specifications for lumber which it may be well to consider and to which attention should be directed. In the first place, this specification appears to be limited to the requirements for car construction. Yet the railroads purchase considerable quantities of lumber for other purposes which, as far as this report indicates to the contrary, would be purchased under different requirements for grading, thus tending to confuse inspectors and add unnecessary complications to the purchase, inspection and handling of lumber for railroad purposes. There is every reason for the adoption of a single specification covering all lumber purchases based on a generally accepted standard method of grading.

There is no reason for any departure from those standards that are in effect for commercial grades of lumber unless it is admitted that those grades cover a quality superior to the requirements for car lumber. Furthermore, that the adoption of special grading for car lumber will favorably affect the price is open to doubt.

One thing should be clearly understood, that is, that these specifications will result in the use of lumber considerably below the grades now used by many, if not by most roads. They will allow more defects than formerly and unless there is some reason for this, not disclosed by the report, it is impossible to escape the conclusion that the advantages from this change will all be on the side of the producer.

Numerous objections to the provisions of the specification may be urged, but I will take time to mention but a few of them. Paragraph 20 provides that sapwood shall not be a defect in any of the grades covered, yet this is a defect which should not be permitted in lumber used for some car construction purposes. Paragraph 33 covering standard finished thickness and width of car sills allows the manufacturer ¼-in. additional each way, that would probably make it necessary to pay for a 5-in. x 8-in. car sill on the basis of 5½-in. x 8½-in., whereas there is no present difficulty whatever in effecting purchases on the existing basis of 5¼-in. x 8¼-in. Paragraphs 34, 35 and 36 make a greater allowance to the manufacturer for dressing which of course is at the expense of the railroads.

There are also some provisions in respect to grading that should receive consideration. Paragraph 41, grading groups 1 and 2 provides for the use of No. 1 common fir or yellow pine for sheathing or exposed roofing for repairs to old cars. In my opinion there may be some doubt as to whether or not these grades will be suited to the purpose.

Paragraph 45 allows the tongue on D and M car lumber to be 1-16 in. scant of standard width. This in my opinion should not be accepted as a full width tongue is essential to proper and satisfactory fitting of dressed and matched stock. In fact, some railroads are now purchasing the face width of some stock under the widths that would otherwise be used rather than accept scant tongue. Paragraph 46 allows wane extending into the tongue and groove of matched lumber which is certainly poor practice.

Paragraph 48 specifies a moisture control, probably obtainable in kiln dried lumber, but it is doubtful if kiln dried lumber should be purchased for all purposes for general use throughout the country. It would certainly be a mistake to buy kiln dried running boards and sills for use in territory where the moisture content of the atmosphere is generally above the maximum specified for such lumber.

Under paragraph 49, B and better sheathing permits three sound and tight ½-in. pin knots and two sound and small ¾-in. knots. This should interest those railroads using fir siding, especially for single sheathed cars, because knots in fir are likely to fall out unless they are intergrown. Paragraph 57 covering No. 1 common running boards permits knots 1½-in. in diameter. This means that in a 6-in. width there will be but 4½-in. or 75 per cent of sound lumber which is not enough for a running board material. A 1-in. knot in a running board is large enough and there is no difficulty whatever in purchasing on this basis.

Paragraph 7 provides, with respect to grading, that the specifications are sufficiently explicit to establish 5 per cent below grade as a reasonable variation between grades and Paragraph 28 requires payment at full price for all that is 5 per cent or less under grade. Now, this means that the railroads must accept and pay for as much as 1,000 ft. of lumber in a carload which is under grade where there is absolutely no reason for doing it. I am aware that there is more difficulty in inspection of lumber than with almost any other material because specification limits can be less exactly defined. Therefore, the judgment of the inspectors becomes an important factor. This is admittedly inconvenient for the dealer but it entitles him to no sympathetic special allowances. Let us strip lumber rejection of all camoflage and clearly understand the facts.

The rejection, subsequent inspection and disposition of lumber is expensive, but every cent of that expense is paid by the consumer. If the producer's business is conducted in business principles he knows exactly what his rejections average and what they cost and this cost is a legitimate part of his production cost and is passed on to the consumer. There is, however, an important

difference as to the manner in which this cost is passed on, and it is all in favor of the dealer. Where the allowable percentage of undergrade lumber is consistently higher from any particular shipper's, this fact will become known in time and purchases may be diverted to other sources more particular in their grading. But where the acceptable percentage of undergrade lumber is held to a minimum, these same consistent high percentage shippers will be obliged to quote higher prices than their more particular competitors, and they will lose out in the purchasing department on initial inquiries.

I move that the portion of the report covering specifications for lumber be remanded to the committee for further cosideration, that appropriate action be taken for inclusion in the specifications of all lumber prepared for railroad purposes, and that before the specifications are again presented as proposed recommended practice, the concurrent approval of the American Railway Engineering Association and of the Car Construction Committee of the Mechanical Division be secured.

J. Purcell (A. T. & S. F.): I second that motion.

F. M. Waring (Penna.): In the report there is no attempt made at this time to recommend that the specifications of lumber be sent to letter ballot for recommended practice. They are simply presented as information. Therefore, it would seem that no action by the Association today is required, except possibly to accept or reject them for publication.

Chairman Smart: And print them in our proceedings?

Mr. Waring: Yes. The committee recognized that the lumber specifications are essentially controversial. We admit there are lots of things in the specifications that not everybody is going to agree with, but we feel that we should give them careful consideration during the coming year and attempt to buy some lumber under those specifications. Let us find out what happens when we do buy under them, because if you simply sit down and write letters to the committee giving your criticisms that will not get us far. We have got to try to buy some lumber under them.

Now, there may be some things badly wrong with the specifications. We will then find them out. The committee is in sympathy with the idea expressed by the previous speaker, that the specifications might well be extended to cover all lumber that the railroads want. The committee will be glad to go into that.

J. J. Tatum (B. & O.): I would dislike this organization to even suggest an idea supporting such specifications for car lumber. They are in no way in reason with our requirements. The moisture contents mentioned alone are enough to refer them back to the committee to get something that we can build by.

W. Foley (Penna.): Division IV, Engineering, of the American Railway Association has already adopted the American Lumber Standard Specifications for all classes except car lumber. This car lumber specification was drafted to take care of car lumber only, which is regarded as being special, and has always been special in the lumber industry.

Mr. Tatum refers to the moisture content specification. The committee uses only the moisture content percentages adopted by the Mechanical Division on the recommendation of the Car Construction Committee in 1927, so they are already standards of the Mechanical Division. If they are not satisfactory the committee on Car Construction should be instructed to change them.

The question of what percentage of the material might be accepted above or below the grade is a matter of judgment. If you decide that five per cent is too much, and zero percentage is what you are going to insist upon, well and good. Those of us who are in contact with lumber inspection on the railroads, and in the industry generally, know that you will never approximate anything like a zero percentage. Most of you now have accepted much more than five per cent below grade in every day practice.

Of course, there will be a lot of differences of opinion as railroads use so many different kinds of wood. Many of you will indulge in paper comparisons of the grades. At times you will buy a grade that permits so many medium sized knots, and because this specification provided more or less you will regard that lumber as unsatisfactory.

As Mr. Waring suggested it would be a good scheme for everybody to take the specifications as proposed and buy some lumber under it, and see what you get. It is utterly impossible to make paper comparisons on lumber. You never get any lumber that has all the defects permissible. At least, it is rarely the case. It is the lumber in the cars that counts, and not what appears in the grading rule books as a mater of comparative description.

Chairman Smart: As we all know, standards are set up by many roads in their specifications for new equipment. I personally know that it is necessary to restrict variation in widths of lumber, especially when building steel-frame cars or all-steel cars. If you get a variation of widths, and the car builders fabricate their steel, you cannot meet the uniform punching for holes for bolting down floors. This is true also of side lining, and single-sheathed cars. The different carbuilders insist on getting as near as possible the exact dimensions of widths of lumber, because in bolting flooring or siding to the frame, the bolts will often come out at the tongue, which is very undesirable. We permit $\frac{1}{16}$-in. tolerance above and below 10 per cent in the culling of lumber. You may get a large quantity of that ten per cent in one car. I believe we should be more considerate in the specification as to the purchase of lumber than is set out in this specification.

H. W. Faus (N. Y. C.): I believe the members do not understand clearly what the Chairman clearly stated in his preface to this specification, and I believe they should understand it before they vote on this motion. It is distinctly stated that this is not submitted for adoption, either as recommended practice or as standard, but is submitted simply to be printed as information in order to receive just the kind of criticisms as we have received this morning.

As I understand it, the only effect this motion could have, if passed, is to forbid the printing of this proposed draft of the specification, and therefore make it impossible to receive the widespread criticism that the committee would like, which is the kind of criticism Mr. Trumbull has already submitted.

Mr. Trumbull: I question whether the adoption of this resolution would prevent either the printing of the specification, or the action proposed by the chairman, and, if acceptable to the seconder, I move that the specification be printed, so that such action as the various roads may desire with respect to a trial of the specification on purchases may be undertaken by them.

It is not my purpose to suggest in any way, or place any limitations upon the action of those roads that may desire to see a change in the existing specification, or to determine to what extent the proposed specification will influence either the purchase or the quality of lumber purchased thereunder.

Chairman Smart: Is that satisfactory to you, Mr. Purcell?

Mr. Purcell: Yes. The only objection I have to these specifications is the moisture content. I think all roads are afflicted with the same trouble that we are. You put lumber into your cars, and when you get them into a warm climate, particularly single-sheathed cars, or even double-sheathed cars, or decking on new cars or on repaired cars, you can stick your lead pencil through the tongue groove; and the decking shrinks all the way from a 1/4 in. to 5/8 in.

Mr. Bravo (National Lumber Association): The moisture content that has been set up in the specifications was determined by the committee, I am sure, after considerable thought, time, and tests.

The moisture content as set up in these specifications calls for 10 per cent on the thinner sheathings, floorings and linings. On decking, which is of thicker material, it is set at 15 per cent. These tests have been based on ascertained facts.

I think that they are correct, and from information received from such agencies as the Forest Products Laboratories of the United States Government, and also our own experience in the uses of lumber, I believe that these moisture contents are as efficient as can be produced to govern all the situations in the country.

It is true that lumber, under exceedingly dry conditions in various arid regions may deflect or diverge somewhat in the course of usage under such extreme conditions. On the other hand, it is also true in certain northern sections where there is a good deal of moisture that you may have some slight divergence on the other side. It would, therefore, seem on the basis of those facts that perhaps the moisture contents as proposed in these specifications might be changed. The endeavor of this committee, I am sure, was to pick out such moisture contents as were adaptable throughout the country as a whole.

Mr. Tatum: I am going to refer to some facts from experience. We had a carbuilder build for us some all-steel box cars. The lumber in the floors of those cars contained 10 per cent moisture content. Because of a point in those cars that had to be corrected they were held waiting a decision on the changes about two weeks during the hot summer weather.

When the change was completed and the floors were examined, there were no tight floors in the cars. Every one had to have a portion of the floor removed and wedges driven in to bring the floors up to a reasonable tightness and new flooring applied to fill the space left by taking up the shrinkage. We insisted that the flooring be of lumber having less moisture content and we exacted 5 per cent.

Later on similar cars were built with flooring having 5 per cent moisture content with entirely satisfactory results.

These things being true, why should we agree to accept something that is not satisfactory?

Chairman Smart: You have a motion before you, but I do want to read just three lines of this report, which I believe is what it was intended to cover here: *"It is recommended that this revision be published as information in order to get it before consumers and producers for criticism and if there are no objections that it be adopted in 1933 as recommended practice".*

I don't see that it makes any difference whether you vote for or against the motion. Your committee here has taken care of practically what the motion calls for. The motion has brought out criticism and considerable discussion, but what this committee wants is for you during this next year to send such criticisms and suggestions in to them so it can be modified at our next meeting.

Mr. Waring: That is exactly what the committee has in mind. We appreciate very much the criticism stated on the specifications today. Evidently it has served a useful purpose. We would like to have you continue that practice during the coming year and let us know the results. It is not intended to take definte action until you are satisfied with it.

Chairman Smart: With that explanation, Mr. Trumbull, are you satisfied?

Mr. Trumbull: As I understand it, the present gradings adopted by the American Railway Engineering Association, and those proposed for the Mechanical Division are not uniform, I certainly think they should be continued and the committee be formally instructed by the Association to secure such uniformity, and also, as I have indicated in the motion, to secure the concurrent approval of the Car Construction Committee.

The motion which is pending will take care of those requirements. Otherwise the committee will be under no instructions to proceed in accordance with the purpose I have indicated.

Mr. Foley: It would be unfortunate if the committee should be instructed to make their grading rules for car construction and building lumber exactly the same. The purpose of car lumber do not correspond exactly with the requirements for siding on a house or flooring on a floor. They have always been different, and there is every reason why they should continue to be different. As I said this morning, Division IV has already adopted specifications for the lumber to go into buildings. Those specifications correspond with American Lumber Standards and they correspond so far as definitions are concerned with the specifications you are considering this morning. They differ only in the description of the grades that are considered suitable for car use and, of course, the committee, I am sure will, be glad to review those grading rules and see what they have in the way of suggestions regarding car lumbers. To insist that the grade of car siding correspond exactly with the grade of house siding would be an unfortunate requirement, and I doubt if the Car Construction Committee would agree with any such proposal. I would regard them as unwise if they did. There are certain things the lumber requires. The present rules have been written for the requirements of car lumber and not the requirements of other kinds of lumber, and these grading rules are designed especially to see you get in car lumber what you should have without reference to other uses which lumber of similar sizes might be put.

Mr. Trumbull: In the discussions which occurred last week we had assurances that if the lumber patterns were changed as proposed that the requirements would be more nearly in accordance with those which are specified for commercial grades. If that be the fact it would seem that the specifications which are applicable to special grades of lumber should likewise be made applicable to those grades which are used as has been indicated here for the special purposes in question.

Most of the railroads here, or certainly some of them, are buying lumber for all purposes under a single specification. If you adopt different rules or different grades for different purposes, you are certainly going to have confusion among your inspectors. Confusion among your inspectors is exactly what produces an acceptance of lumber below the specified grade which apparently the committee has under consideration.

O. C. Cromwell (B. & O.): I would like to bring

another phase of this proposition before you. We are talking about the amount of face of flooring and siding. I don't see any reason for any variation in width of face if a builder gives particular attention to the milling of the lumber. It is quite essential to railroad use to maintain almost 100 per cent of width of face for flooring and siding, particularly nowadays when we are going into steel car construction where there is no opportunity to make or take in applying flooring or sheathing and, if the manufacturer will give close attention to what he is producing, he can do that at no additional production cost.

What do we do in locomotives? We can switch parts from one locomotive to another and find things interchangeable. If it hadn't been for extreme care in the production of those parts we couldn't have done that. Now, we have passed that on to our cars, and we can take a part from one car to another and we can fabricate those parts and keep them in stock and facilitate repairs. Why not come down to the lumber side of the game and do the same thing?

[*Mr. Trumbull's motion was carried.*]

[*A motion to change the report and send recommendations to the committee as specified was seconded and carried.*]

Report of Joint Committee on Reclamation

Discussion of Study made by representatives of the Mechanical and Purchases and Stores Divisions

The Joint Committee on Reclamation is made up of members representing the Mechanical and Purchases and Stores Divisions of the American Railway Association. The report of the committee was presented first at Friday's session of the Purchases and Stores Division convention, together with the Report on Reclamation and Scrap Handling, and the two reports were discussed together. Owing to the fact that an abstract of the report of the Joint Committee was published in the proceedings of the Purchases and Stores Division on page 1548D45 of the RAILWAY AGE DAILY EDITION of Saturday, June 21, it is not printed here. For the Mechanical Division, the report is signed by J. W. Bukey, former reclamation superintendent, Pennsylvania; G. H. Gjertsen, master welder, Northern Pacific; L. W. Wink, assistant superintendent, car department, Chicago & North Western. The Purchases and Stores Division report is signed by I. C. Bon (chairman),

A Southern Pacific Freight Train in the Sierra Nevada Mountains—The Locomotive, of the 4-8-8-2 Type, 120 ft. Long, and with a Tractive Force of 120,760 Pounds, is Especially Designed for Mountain Service

superintendent of reclamation, Wabash; G. W. Lieber, superintendent of reclamation, Missouri, Kansas & Texas; A. L. Prentice, supervisor of scrap and reclamation, New York Central Lines, and W. P. Stewart, superintendent of scrap, Illinois Central.

Discussion

C. T. Ripley (Santa Fe): One portion of the report refers to building up collars on axles. The general opinion of the wheel and axle committee is that they do not want to do anything to encourage that practice. We have consistently recommended the reclamation of axles by working them down to a smaller size. We still think that is the only proper way to do the job. These collars are being built up improperly, with the journal length down to limit sizes, and the collars smaller than they should be. That leads to hot boxes and a rule was put into the code to stop that.

We have this year extended the limit of weights for these journals. That was a move to permit getting the material out of the axle rather than by building up a collar.

Mr. Tatum: Mr. Ripley has suggested an important matter. That is, how long can we continue an axle in service by reclamation and still have a safe axle?

I don't know of any information available that gives us advice as to how long an axle may be used in high-speed passenger service before it becomes unsafe. That is also true of freight cars. It is important that we have some information as to how long axles may be reclaimed for service with safety.

Mr. Cromwell: Referring to that portion of the report regardng reclamation of helical springs, that subject should be gone into with considerable caution and forethought.

Helical springs fail on account of not being uniformly coiled. If all the coils came to a bearing at the instant that they became solid, you would not have any failures, but you have one coil a little different from another you get a bending down of the bar that causes it to fail.

Before reclaiming coil springs you had better examine them very closely and see whether there are any small cracks or fissures in the surface. The failure of driving axles and other shafts can be caused by a small scratch on the surface which is the beginning of a failure. So in coil springs, a small crack in the bar will lead to a failure.

Mr. Tatum: I move that the paper be accepted and the committee continued.

[*The motion was seconded and carried.*]

Report on Automotive Rolling Stock

The work of the committee involved the running of comparative operating tests on three roads

C. E. Brooks
Chairman

Rail motor cars have been designed and developed to utilize a variety of fuels. At present the principal grades in general use are gasoline, distillate and fuel oil. The choice of fuel to be used on any given railroad is governed primarily by the location of that railroad with respect to its oil supply; the choice may also be influenced by mechanical features of the motor car equipment for burning the various grades. With this in mind, the Automotive Rolling Stock Committee proposed to make a series of comparative tests of different types of fuel as utilized in the various rail motor cars designed for each type of fuel. It was thought such a series of tests would produce information and data which would be useful to any railroad undertaking the selection of rail motor equipment best fitted to its own needs.

In order to eliminate as many variables as possible, it was decided to run the tests on three representative railroads in the same general geographical territory; the characteristics of the runs, the profiles, the classes of service and the fuel sources would, therefore, be comparable. Furthermore, motor cars of the same or nearly the same horsepower and with similar electrical equipment would be selected.

It was originally decided to obtain a figure on each of the three railroads of kilowatt hours per gallon of fuel consumed. Such figure to a great extent would exclude variable conditions external to the car, such as, for instance, wind resistance, grade resistance, high or low temperature, etc. Load factor, however, would still affect the results, as it might influence the efficiency of the various power plants. It is interesting to note that, working towards an ultimate figure of kilowatt hours per gallon of fuel used, sufficient additional information was obtained to make possible considerable enlargement of final results.

Instruments

It was the desire of those conducting the tests to make all the runs under as nearly actual operating conditions as possible. Therefore, the decision was made to install the fewest possible meters consistent with the result to be obtained, such meters being compartively small and easily installed. A graphic watt meter was installed to measure the output of the main generator and a second graphic watt meter was installed in the exciter circuit to measure auxiliary power. To obtain figures of total kilowatt hours for both the main generator and exciter, locomotive type watthour meters were also installed. The purpose of the graphic meters was to give a picture of the load curve of the power plant at any particular part of the runs, while the purpose of the watthour meters was to furnish figures of total energy over any part or parts of the test runs.

The tests were restricted to single power plant cars, both on account of the number of meters it would have been necessary to transport from one railroad to another, as well as on account of the difficulties experienced in breaking main power connections and installing the various meter shunts.

The graphic meters had just been received from the factory, which made unnecessary any calibration. The locomotive type watthour meters, however, were designed and built for a constant potential of 600 volts d. c. Since the main generators and exciters to be encountered in the tests had respective voltage ranges of 275 to 600 volts and 45 to 80 volts, it was necessary to resort to special calibration for the watthour meters. Accordingly, one meter was calibrated for a main generator voltage of 450, with additional calibration curves for 600 volts and 275 volts. This meter operated with an external resistance in the potential circuit and in connection with a 75 millivolt shunt.

The second watthour meter was calibrated for 60 volts, with additional calibration curves for 45 volts and 80 volts; the external resistance was eliminated and an 80 millivolt drop shunt was used.

Accuracies and Inaccuracies Present in the Tests

Laboratory accuracy is claimed for none of the tests or the results. It is possible to determine killowatt hours per gallon of fuel for any power plant in the shop or on the test floor by artificial loading. It was thought to be more representative of actual conditions, however, to obtain such a figure during regular service runs. Enginemen were instructed to handle the cars in their regular manner and forget the test instruments or personnel so far as possible. For the most part this was done and the results are considered comparable to everyday operation.

The fuel measurements may be susceptible of certain errors. On the whole, the measuring pumps were found to be reasonably accurate when checked with standard measure. Necessary corrections were made in the total. When delivering fuel from tank

Date	R.R.	Car Nos. Motor	Car Nos. Trailer	Engine Mfr. & Model	H.P.	Fuel	Generator Mfr. & Model	Control	Test Run From	Test Run To	Mls	Time Sched.	Time Actual	K.W.H. Gen.	K.W.H. Ex	K.W.H. Total	U.S. Gals Fuel	Mls per Gal.	W.H. per T.M.	KWH per Gal	Over all Eff. of P.P.
Feb. 6	U.P.	M-24	T-19	Hall Scott 350	300	Distillate	West.181A4	"K"	Leavenworth	Miltonvale	164	8'25"	8'06"	440	10	450	95.5	1.72	34.7	4.71	11.7%
Feb. 7	"	M-41	1773	" " "	"	"	West.181A	Torq gov.	Salina	Oakley	188	8'0"	7'59"	698	26	724	139.0	1.35	30.5	5.20	12.8%
Feb.7,8	"	"	"	" " "	"	"	" "	"	Oakley	Salina	190	7'15"	7'02"	437	23	460	95.5	1.99	15.2	4.82	11.9%
Feb.7,8	"	"	"	" " "	"	"	" "	"	Round trip		378	15'15"	15'01"	1135	49	1184	234.5	1.61	24.8	5.06	12.8%
Feb.9,10	"	M-40	-	" " "	"	"	" "	"	Denver	Ft.Collins & Rt	130	3'58"	3'49"	305	12	317	57.0	2.28	41.9	5.56	13.7%
Feb.12	"	M-30	T-10	" " 160	"	"	G.E.DT507C	"K"	Kearney	Stapleton & Rt	204	7'55"	7'46"	508	13	521	94.0	2.47	28.6	5.55	13.7%
Feb.16	C&NW	9918	188	Winton 120	275	Gasoline	G.E.DT507B2	"K"	Des Moines	Ames & Rt (2)	138	4'20"	4'30"	440	8	448	94.5	1.46	34.0	4.75	13.1%
Feb.18	"	9920	1124	" "	"	"	" "	"	Eaglegrove	Fox Lake & Rt	199	6'58"	6'55"	570	13	583	105.5	1.89	33.3	5.53	15.2%
Feb.19	"	9912	1069	" "	"	"	" "	"	Wall Lake	Tama	146	5'35"	5'31"	390	9	399	80.0	1.83	34.4	4.99	13.2%
Feb.20	"	9926	1109	" 146	300	"	G.E.DT516A	"	Carroll	Sioux City & Rt	256	9'35"	9'37"	950	17	967	194.5	1.32	41.1	4.97	12.7%
Feb.27	CNR	15829	15740	Beardmore -	300	Fuel oil	West.198KW	Torq gov.	Winnipeg	Somerset & Rt	204	8'10"	8'06"	653	15	668	57.6	3.54	32.5	11.60	26.3%
Feb.28) Mar.1)	"	"	"	" -	"	" "	" "	"	"	" "	204	8'10"	7'59"	728	14	742	72.0	2.84	36.1	10.31	23.4%
Feb.27) Feb.28) Mar. 1)	"	"	"	" -	"	" "	" "	"	"	" & Rt (2)	408	16'20"	16'05"	1381	29	1410	129.6	3.15	34.2	10.88	24.7%
Mar. 4	"	15827	15741	" -	"	" "	" "	"	Saskatoon	Regina	220	8'15"	8'10"	693	12	705	67.2	3.28	31.0	10.49	23.5%
Mar. 5	"	"	"	" -	"	" "	" "	"	Regina	Saskatoon	225	8'35"	8'33"	648	13	661	63.6	3.54	28.7	10.40	23.3%
Mar.4,5	"	"	"	" -	"	" "	" "	"	Saskatoon	Regina & Rt	445	16'50"	16'43"	1341	25	1366	130.8	3.40	29.8	10.43	23.4%

Note; Union Pacific figures corrected for road miles on gasoline.

Fig. 1—Complete Tabulated Data on Each Run of the Entire Test

wagons, special care was taken to bring the fuel to the exact level in the measuring cans, and where cars were equipped with hand pump the fuel was measured as accurately as possible from drums in calibrated gallon or half-gallon measures.

Mileages as given and used are only betwen stations, the relatively few miles operated between stations and engine houses being neglected. This was necessary on account of the various methods of handling motor cars and trailers between engine houses and stations on the various railroads. In some cases a steam switcher was employed; in other cases the trailer was uncoupled and the motor car operated alone, and in other instances both motor and trailer car were operated to and from the roundhouse.

Description of Tests

The railroad with probably the longest experience in the use of distillate for rail motor cars is the Union Pacific. Owing to this and to the fact that it had available for test single power plant cars of 300 hp., it was selected for the distillate tests. The Canadian National operates two oil-electric rail motor cars of the same nominal horsepower in western Canada, and having had particular experience with the type of fuel, were selected for the fuel oil tests. The Chicago & North Western operating in the same central territory, has single power plant cars of about the same horsepower, and it was accordingly selected for the gasoline tests.

The general procedure in the case of every car tested was approximately as follows:

At the enginehouse or terminal the watthour meters and graphic watt meters were installed and meters tested for correct direction of readings, etc. The fuel tank or tanks were filled just to the point of overflowing; watthour meter readings were taken at the start and end of the run; and at each regular stop; also time of arrival at each station was noted. In the case of the Union Pacific cars, where two kinds of fuel were used, meter readings were taken only when operating on distillate.

A sample of the fuel used in each car for each run was obtained and analysis made to determine B. T. U. value and

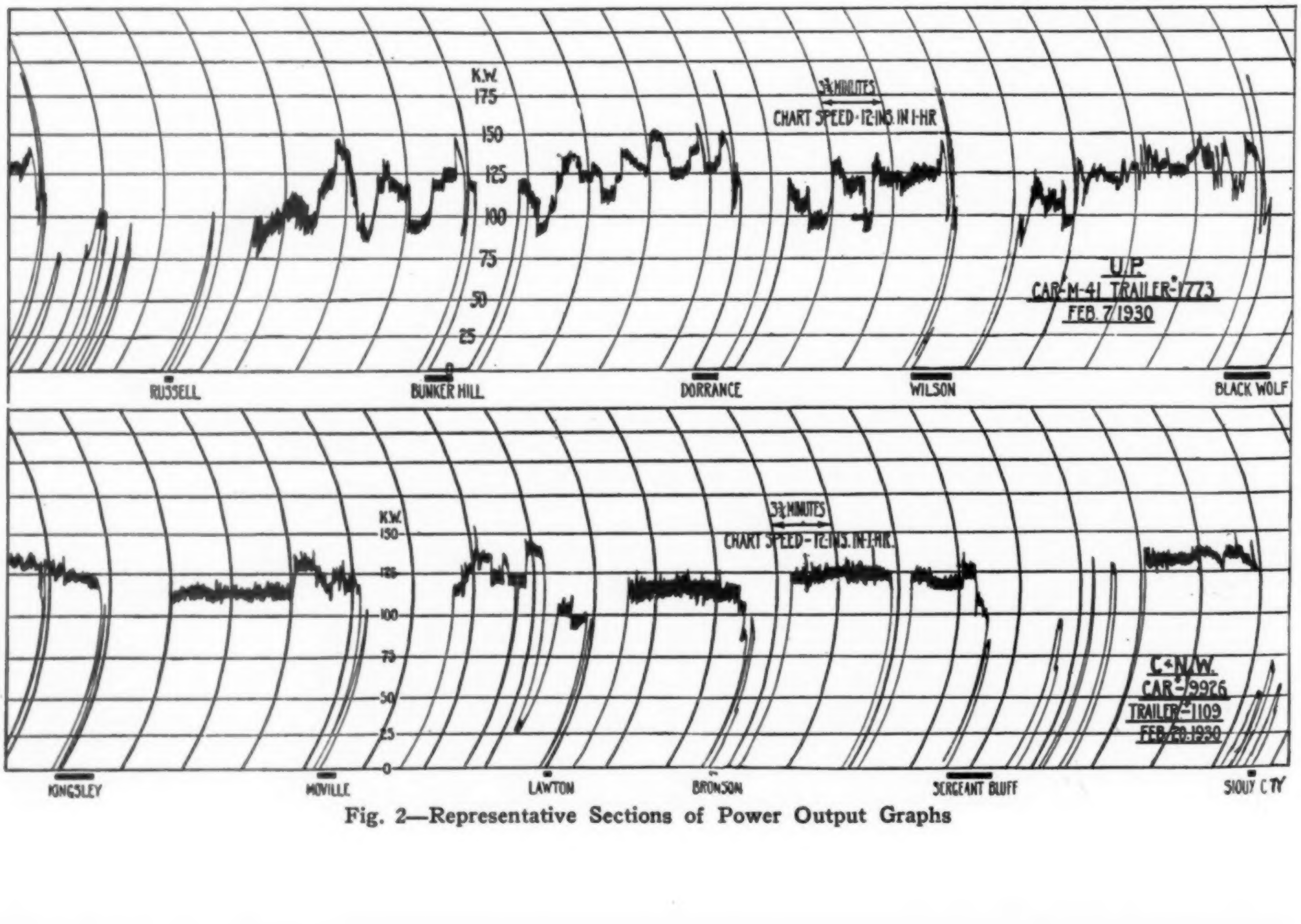


Fig. 2—Representative Sections of Power Output Graphs

gravity. Table I shows standard specifications of the various fuels, together with the data obtained from individual samples taken on the tests in question. Relative costs as obtained from the purchasing departments of the various railroads in question are also shown for comparison.

A synopsis of runs on the three railroads follows:

Union Pacific System

First run, Leavenworth, Kansas, to Miltonvale, Kansas. Distance between stations 166 miles, distance credited to distillate operation 164 miles. Motor No. M-24, trailer No. T-19. Severe grades in spots, particularly when leaving Missouri River Valley; otherwise generally flat, rolling country. Total estimated load, 3 tons; total light weight of train, 76 tons.

Second run, Salina, Kansas, to Oakley, Kansas and return. Total miles 380, total miles credited to distillate operation 378. Motor No. M-41 and main line steel baggage car No. 1773. Some severe grades, but mostly flat prairie country. Total estimated load, 8 tons; total light weight of train, 117 tons.

Third run, Denver, Colo., to Fort Collins, Colo., and return. Total distance 136 miles, total credited to distillate operation 130 miles. Motor car No. M-40, without trailer. This was an exceptionally fast run over flat, rolling country. Total load estimated at 2 tons; light weight of car, 56 tons.

Fourth run, Kearney, Neb., to Stapleton, Neb., and return. Total distance 205 miles, of which 204 miles were credited to distillate operation. Motor car No. M-30, trailer No. T-10. Run was through rolling country with worst grades westbound. Total load estimated at 4 tons; total light weight of train, 85 tons.

Table I—Analyses of Different Fuels Used

Analysis of Distillate Used on Union Pacific Cars Tested

Place	Gravity Beaume at 60 Deg. F.	Specific Gravity	B. T. U. per Pound
Leavenworth	36.4	.8430	19,591
Oakley	35.1	.8490	19,573
Salina	35.4	.8470	19,559
Denver	35.1	.8490	19,557
Kearney	35.3	.8475	19,620

All above were "Parco" Prime White Distillate in accordance with the following:

Gravity	35.6 Deg. Beaume
Initial boiling point	362 Deg. F.
20 per cent over at	420 Deg. F.
50 " " " "	448 Deg. F.
90 " " " "	526 Deg. F.
95 " " " "	576 Deg. F.
End point	614 Deg. F.
Viscosity at 100 Deg. F.	(U. S.) 34
B. t. u. per lb.	18,700
Cost per U. S. Gallon	5 cents.

Gasoline Used on Chicago & North Western Cars Tested

Place	Car	Specific Gravity at 60 Deg. F.	B. T. U. per Pound
Tama	9912	.7428	20,820
Des Moines	9918	.7424	20.013
Eagle Grove	9920	.7439	20,074
Carroll	9926	.7436	21,614

All gasoline used is of the ordinary commercial grade.
Cost per U. S. Gallon.......................12½ Cents

Analysis of Fuel Oil Used on Canadian National Cars Tested

Car	15827	15829
Gravity	15 Deg. B.—S.G.-9655	17 Deg. B. —S.G.-9524
Viscosity at 100 Deg. F. (U.S.)	64 secs.	61 secs.
Flash	206 Deg. F.	190 Deg. F.
Sediment	Trace	Trace
Water	None	None
Cold test	Below —25 Deg. F.	Below—25 Deg. F
Sulphur	0.5 per cent	0.7 per cent
B t. u. per pound	18,900	18,965

Cost per U. S. Gallon...........................7½ cents

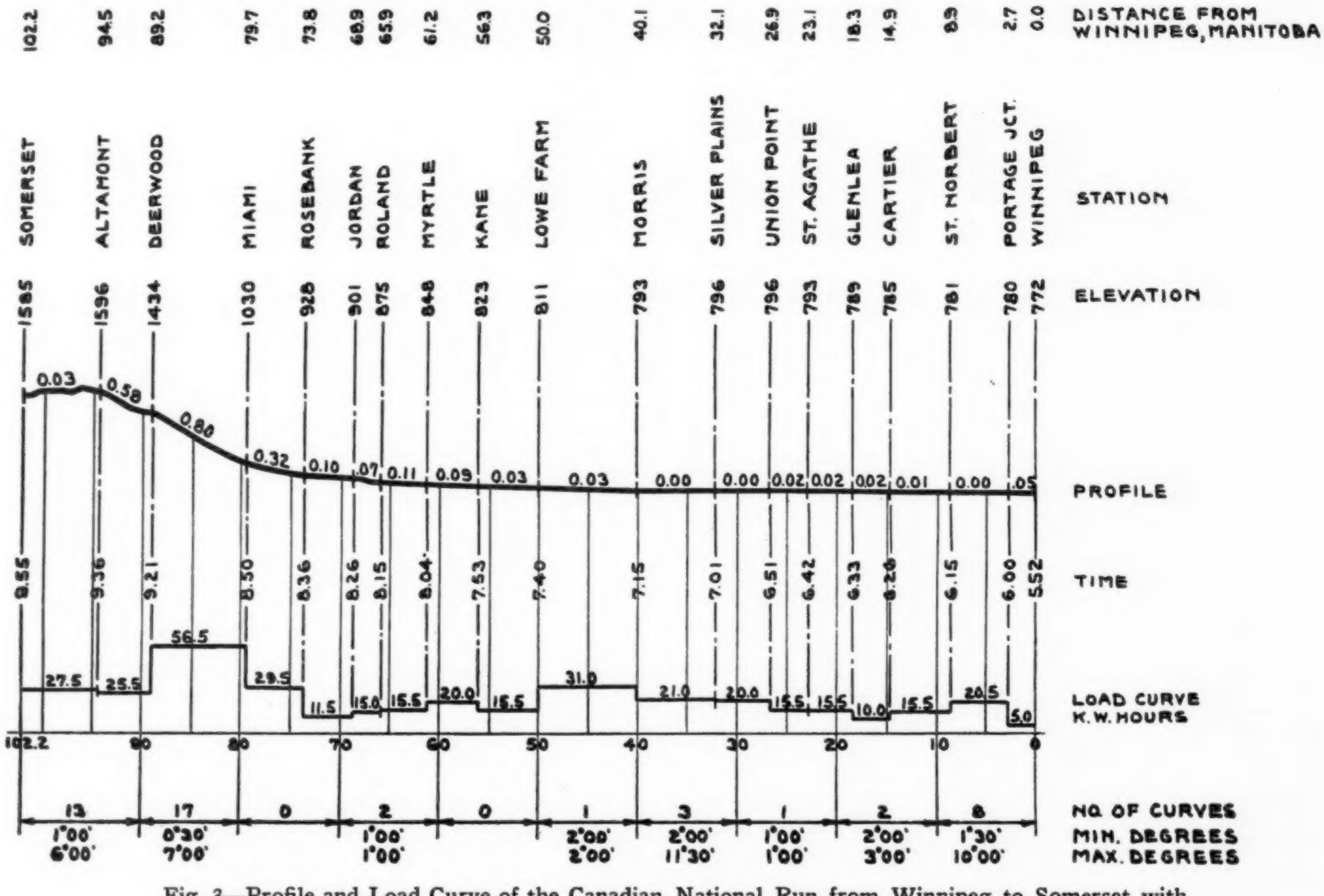


Fig. 3—Profile and Load Curve of the Canadian National Run from Winnipeg to Somerset with Car No. 15829, and Trailer No. 15740

Chicago & North Western Railway

First run. Des Moines, Iowa, to Ames, Iowa, and return (two round trips). Total miles, 138. Motor car No. 9918, trailer No. 188. Fast runs in Sunday service between the two cities, with heavy grades in each direction. Total load estimated at 2 tons; total light weight of train, 93½ tons.

Second run, Eagle Grove, Iowa, to Fox Lake, Minnesota, and return. Total miles, 199. Motor car No. 9920, trailer No. 1124. Rolling country with some severe grades. Total load estimated at 4 tons: total light weight of train, 89 tons.

Third run, Wall Lake, Iowa, to Tama, Iowa. Total miles, 146. Motor car No. 9912, trailer No. 1069. Rolling country with ruling grade favorable to eastbound movement. Total load estimated at 6 tons; total light weight of train, 73 tons.

Fourth run, Carroll, Iowa, to Sioux City, Iowa, and return. Total miles, 256. Motor car No. 9926, trailer No. 1109. Roll-

ing country with very heavy grades in spots. Total load estimated at 5 tons; total light weight of train 87 tons.

Canadian National Railways

First run, Winnipeg, Man., to Somerset, Man., and return (two round trips). Total mileage, 408. Motor car No. 15829, trailer No. 15740. Extremely severe 15-mile grade westbound, otherwise flat, prairie country. Very severe snow conditions on second westbound trip. Total load estimated at three tons for three one-way trips and two tons for the fourth trip; total light weight of train, 98 tons.

Second run, Saskatoon, Sask., to Regina, Sask., and return. Total miles, 445. Motor car No. 15827, trailer No. 15741. Mostly flat, rolling country with several severe grades in each direction. Total load estimated at 5 tons southbound and 4 tons northbound; total light weight of train, 98 tons.

Data Obtained

With exception of several runs where it was impossible to install the graphic wattmeter, graphs of each run were obtained. Representative sections of these are shown in Fig. 2. These graphs appear for both main generators and exciters, and give a clear and complete record of power outputs during the test runs.

An inspection of the graphic records brings to light a very important factor, namely, that the average power plant in a rail motor car is rarely up to full capacity, and, if so, but a very short time in the total run. In each run there is considerable time when the engine is either shut down or idling.

It is particularly interesting to compare the last half of the two runs from Winnipeg to Somerset, shown in Fig. 3. The first was made on a quiet, cold winter night, the engine throttle being advanced only to the sixth notch at maximum; the second was made in an extremely severe blizzard where snowdrifts as high as the car floor were encountered and where the throttle was advanced to its extreme open position.

In the chart taken from one of the cars where the compressor is operated from the exciter, it is interesting to note the frequent cutting in and out of the air compressor motor, and the relatively large portion this energy is of the total auxiliary load.

It is to be noted that the over-all efficiency of the oil-electric power plant is about 10 higher than the figures for the gasoline or distillate plants. This is quite evidently due, as would be expected, to the higher inherent efficiency of the oil engine. Gasoline and distillate power plants show approximately the same over-all efficiency. The important point to note in this connection is the fact that approximately the same kilowatt hours are obtained from a gallon of distillate as from a gallon of gasoline. In view of the price differential of seven and one-half cents as on the Union Pacific and the Chicago & North Western, this shows the potentialities of burning distillate if a given railroad can economically obtain a good supply.

Kilowatt hours per gallon are an approximate measure of the over-all efficiency of the power plant, assuming the same B. t. u. and gravity characteristics of the different fuels. For any two cars operating from the same fuel, the kilowatt hours per gallon figure obtained is a direct measure of the efficiency from the raw fuel to electric energy at the main generator and exciter terminals, and is a relatively convenient figure to obtain.

Conclusions

The results set forth in this report are in no way to be considered as reflection on the performance of any of the railroads involved. We believe the data obtained will be helpful to any railroad considering the purchase of internal combustion rail car equipment as pointing out what may be considered representative conditions to be met with the three classes of fuel.

Any railroad, in making a decision, however, should take into account not only the cost and efficiency of conversion of a power plant using a given fuel, but also the accompanying expenses for maintenance, lubricating oil, etc., resulting from the use of it.

[Note—The report also contained a list of all the rail cars placed in service on American railroads since 1923. Because of its great length the list is not reproduced here.—Editor.]

The report was signed by C. E. Brooks (chairman) chief of motive power, Canadian National; B. N. Lewis, mechanical superintendent, Minneapolis, St. Paul & Saulte Ste. Marie; F. K. Fildes, assistant engineer, Pennsylvania; A. H. Fetters, mechanical engineer, Union Pacific, and P. H. Hatch, engineer of automotive equipment, New York, New Haven & Hartford.

Discussion

C. T. Ripley (A. T. & S. F.): We want to know about this fuel question. There is a lot of difference of opinion as to whether you should burn distillate or gasoline. The committee hasn't given a definite decision, and I know they can't, due to important conditions. In the west it has been generally accepted that rail motor cars best afford to burn distillate if there is a differential of two and one-half points.

You have more dilution of the oil in the crank case. That means increased cost of lubricating oil which is a big factor in the operating of rail motor cars. You can beat this through a reclamation plan, with a small investment. Reclaimed oil is just as good and in cases better than new oil. Therefore, that is not as big a factor. There are those who claim that maintenance of their engines is higher. That is a point I would like to have the committee give us more information on. It is a stock argument which the distillate man puts up. Personally, I doubt it. To be sure you have to clean spark plugs more often. I still think your two and one-half point differential is the point where we can use the distillate, and if we use more distillate the refineries can furnish a better grade and at a better price.

Chairman Smart: Some of you might want to consider fuel cost in switching operation in your yards, your coal fired switch engines. If you went to something like this you will find a big reduction in fuel cost. I know there is quite a reduction that can be made in utilizing this type for your switching engines.

C. E. Brooks (C. N.): I am rather astonished at Mr. Ripley's remarks, particularly insofar as they refer to incomplete information. It took two members of this subcommittee six weeks of road time to develop the information we have, and that information is absolutely definite and clear with regard to fuel cost and fuel cost only. If we made any attempt at this time to combine the tabulations of fuel costs, lubricating oil costs and repair costs, it would take the entire committee at least a year to do it, and doubt then if we would be able to present to this association any figure any railroad would agree with.

The first reason is that when we get into repair costs there is such a variety of means of accepted standards of determining these costs. It was our idea in preparing this report to attempt to show you definitely the amount of work which in road service on representative American railways you can get out of one gallon of gasoline, one gallon of distillate and one gallon of fuel oil, and we believe we did that and did it successfully.

We picked out a distillate railroad, knowing all the arguments there were about the use of distillate, a railroad which we believe has had as much experience in using distillate as all the rest of the roads in this country put together.

In that way we thought that we at least had given distillate a satisfactory break. I believe if you will look at the table where we show the number of kilowatt hours per gallon, in the next to the last column, and also miles made per gallon, you will see that distillate doesn't need to offer any apology to the gasoline promoters.

I agree that there is going to be quite an extended use of the automotive rail car. If you will look at the summary at the end of the report it will indicate to anybody that the use is growing, and growing fast, of all kinds of cars. You know from observation and your own experience that there are large gasoline plants being put into cars and I think that the words of Mr. Ripley with regard to a price differential, particularly in the Western states where good qualities of distillates are obtainable, is something that has to be given consideration in determining exactly the kind of power plant put in.

I might say that while I did not have the opportunity of attending the road test on any one of the three roads,

that the report of the subcommittee in regard to the performance of distillate operated cars of the Union Pacific was excellent, and I don't mean by that that they had to throw any bricks at the performance of either gasoline or fuel oil. I think these figures will speak for themselves. I certainly do not advocate the use of fuel oil on rail cars. Personally I believe in it and all our experience points that way. I might say when you get to talking about repair costs that you get into some dangerous territory. The committee's work had barely been completed when I heard through a roundabout source that while fuel oil had made a very nice performance that our cost per mile for repairs was something like eleven times the cost of the distillate road which was tested. That information came from somebody that knew nothing except that he knew how to talk.

As to our repair costs I can't tell you how they compare with the representative gasoline operated road, nor with the distillate operated railroad.

It was our intention next year to present to you some definite figures on lubrication. I think, as we all know, the gasoline operated machine is probably the cheapest lubricating job that there is. Both fuel oil and distillate have lubricating problems, but I think these problems are being met fairly and efficiently. I am not exactly sure that we can develop this report on lubricating oils for the next meeting, but we certainly will during the next two years if we are allowed to continue in our efforts.

When we get into the repair costs on these roads, as far as I am concerned, you can turn this over to auditors, because I am quite satisfied that the chairman of this subcommittee, and the members of this committee cannot develop accurate costs which you will be satisfied with as real data.

[*A motion to accept the report was seconded and carried.*]

Report of Committee on Lubrication of Locomotives

Investigates pressure grease and automatic oiling systems——Reports on split driving-box brasses

G. W. Ditmore
Chairman

During the past year this committee, jointly with the Sub-Committee on Locomotive Design and Construction, continued investigations of locomotive lubrication practices in various parts of the country.

Pressure Grease System

The pressure grease system of lubrication as applied to valve motion, link blocks and pins, shoes and wedges, spring rigging, buffer faces between the engine and tender, and stokers as reported by this committee last year is being given general consideration.

The question of lubrication cost per engine mile, the pressure grease system compared with oil lubrication, shows up to this time that the cost to lubricate under the pressure grease system is slightly greater. Many parts that were neglected with hand oiling are lubricated with the pressure system and in this connection a saving in time of engine crews, and reduction in wear of parts accomplishes a substantial saving.

Tests have shown that any part of the locomotive equipped with the pressure grease system, except on the link block, will operate at least 1,000 miles before another application is required. However, the usual runs between an application of grease range from 500 to 1,000 miles according to the location of the enginehouses where the work is performed.

The design of grease grooves in bearings on locomotives equipped for soft grease lubrication are important. It has been conclusively shown in service that spring hanger and equalizer pins, which, as a general practice have heretofore been doweled, must have such dowels omitted, permitting pins to revolve to obtain lubrication.

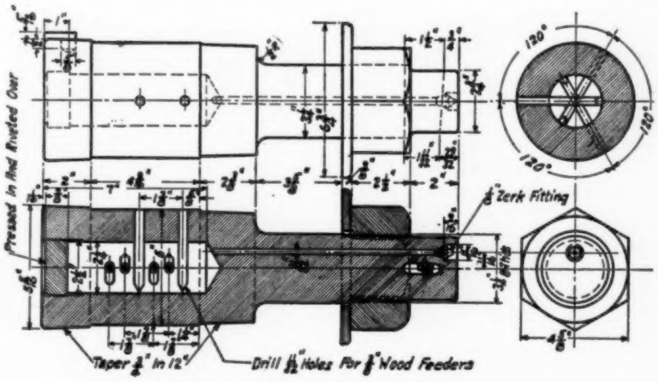


Fig. 2—Crosshead Pin

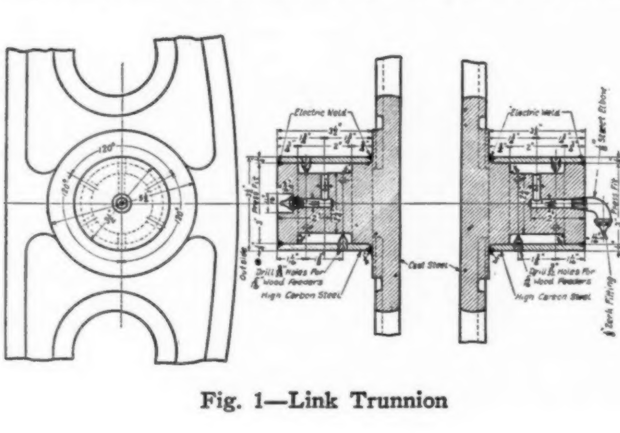


Fig. 1—Link Trunnion

When pins are doweled and the grease fitting is applied to the point of heaviest load, a shoulder is developed on the pin which prevents the entrance of the grease from the grease gun. If the grease fitting is applied away from the point of heaviest load, the grease will not work itself toward point of heaviest load and this point will remain dry.

When designing bearings for soft grease lubrication, grease reservoirs should be made of as large a capacity as practicable. The greater the capacity the greater the distance the locomotive can be operated between applications of grease.

From the studies and observations made by this committee, we are convinced that the pressure grease system of lubricating parts of locomotives heretofore lubricated with the engineman's hand oil can is far superior to the hand oil method and undoubtedly results in a substantial reduction of wear to bearings as a result of more efficient lubrication. The committee feels that the application of this system is worthy of extension.

This committee recommends that on all new locomotives, all journals and crank pins be ground to a smooth finish by builders to avoid excessive temperatures when first placed in service; also when axles and pins are renewed in railroad shops.

Engine-Truck Bearings

At the present time there are in service three improved types of engine-truck bearings; viz., roller bearings, floating bearings and outside bearings.

The committee has followed the performance of these im-

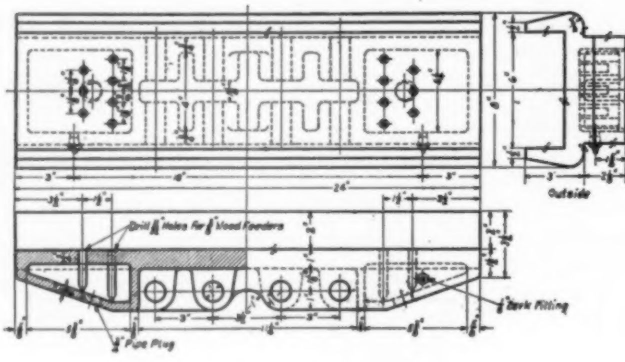


Fig. 3—Crosshead Gib Brass

proved bearings and reports them as a substantial improvement over the old standard waste-packed inside cellars; and recommends that these improved types be given further consideration.

Automatic Oiling System

The committee visited the shops of a member road which has for the past two years been developing a new system of lubricating locomotive parts. This system briefly consists of providing an oil chamber in the various bearing pins with holes drilled to the bearing surfaces and such holes plugged with a specially treated wood. The oil chamber is charged with car oil by means of an oil gun through a Zerk fitting. The wooden plugs act as a wick drawing the oil from the oil chamber and feeding just a sufficient amount to the bearing to maintain necessary lubrication.

One engine inspected had the following pins equipped; Back-end eccentric rods, front-end eccentric rods, link blocks, top radius hangers, bottom radius hangers, top combination levers, bottom combination levers, front-end union links, back-end union links, front-end radius rods, valve crossheads, link casings, main crosshead pins, bell trunions, crosshead shoes, engine-truck hub liners, trailer-truck hub liners, side-rod knuckle pins, driving boxes to lubricate shoes, wedges, hubplates, and journals, and reverse-shaft boxes.

Bearings are charged with oil each 15 to 30 days. It required one man 15 min. to charge all the bearings on an engine equipped as described.

The pins and bushings of a valve gear equipped with this system were examined after 40,000 miles of service, found to be in good condition and were reapplied to the locomotive without any repairs.

It is the opinion of this committee that insofar as valve gears, crosshead pins and knuckle pins are concerned, the applications thus far in service have shown this system to be efficient, economical and a substantial improvement over the old hand method of lubrication of these parts. The system as applied to driving-box shoes and wedges, engine-truck and trailer hub liners is still in a development stage. We believe this system of lubrication is worthy of application for trials to further demonstrate its advantages.

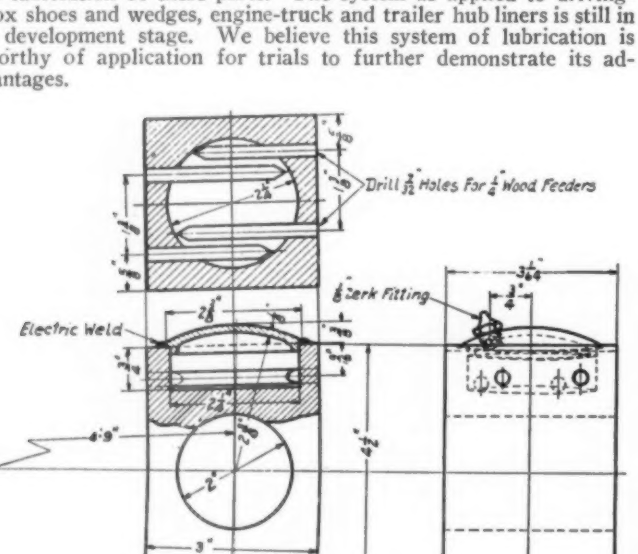


Fig. 4—Link Block

Typical applications of this automatic oiling system are shown in Figs. 1 to 4.

[The report shows drawings of fourteen different applications of the automatic oiling system described in the preceding paragraph. The drawings omitted are the knuckle pin, valve-rod crosshead, union-link collar bushing, bottom combination-lever pin, valve-rod crosshead pin, link-block pin, top reverse lifting-link pin and eccentric-rod pin, eccentric crank pin, bottom reverse lifting-link pin and the combination-lever pin. The application of the wood pins to these locomotive parts is similar to that shown for the crosshead pin, Fig. 2.—EDITOR.]

Split Driving-Box Brasses

The committee investigated the performance of split driving-box brasses in use on the lines of a member road.

Fig. 5 illustrates the design and application of this split driving-box brass. The brass shown is of the same design as the road's standard except it is split lengthwise through the crown and 1/16-in. clearance is provided between the toes and toe fit in the driving boxes. It will be noted that they do not make use of plugs in the top of the driving brasses to anchor them to the boxes. Instead, a flange is provided at the hub end ½-in. high and ⅞-in. wide. A retainer ring is welded to the box at the inside, merely as a precautionary measure to prevent the brass from escaping from the box in case the flange at the hub end should break off. When a brass is applied, it clears the retainer ring and never comes in contact with it unless the flange should break. To date, this has not happened.

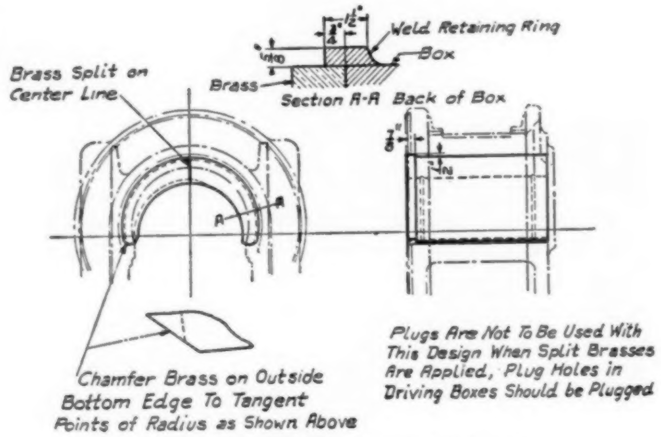


Fig. 5— Driving Box Brass Application

When applying these split brasses, they are cut in two through the crown while the brass is in the rough. The two halves are then placed together and the outside is machined to a slip-fit in the box. The brass is then placed in the box and wedged at the toes to hold it in position while the bearing face is bored to the proper dimension. The practice is to bore the driving brasses 1/32-in. larger than the journal. The only grease grooves or cavities provided are two on the rising side, which lead to the crown as shown on the print. The lower edge of the brass on the rising side is relieved somewhat in accordance with the usual practice to assist the feeding of the grease. The brasses which we inspected when the boxes were removed from the journals could be pushed out of the box by hand. A surprising feature of this application is that there is no more pound of the journal in the brasses perceptible than with solid brasses. The driving boxes run at so much lower temperature that wedges can be adjusted considerably closer, as it is not necessary to provide for so much expansion in the boxes and this, in turn, reduces the pounding of the driving boxes.

The use of split brasses on Mallet locomotives on which formerly it was necessary to repack driving-box cellars after every trip of 120 miles has reduced excessive heating troubles until with split brasses the cellars will run from 7,000 to 9,000 miles without repacking.

On 4-8-4 passenger locomotives which run 745 miles through territory of heavy grades and severe curves, with solid brasses it was necessary to repack all driving cellars at the end of each run. Since split brasses were applied the engine has made 6,014 miles without any repacking of driving cellars.

This road has at the present time 14 locomotives equipped with split driving-box brasses.

Our investigation of their performance satisfies us that a substantial improvement has been brought about by their use and that this design merits trial on other roads. If such trial demon-

strates similar merit, it is our recommendation that Rule 137 of the Interstate Commerce Commission, Division of Locomotive Inspection, Laws, Rules and Instructions for Inspection and Testing of Locomotives and their appurtenances, should be revised to permit the use of these split brasses.

The report is signed by G. W. Ditmore (chairman), master car builder, Delaware & Hudson; H. W. Johnson, superintendent of motive power and rolling stock, Minneapolis & St. Louis; P. Maddox, superintendent car department, Chesapeake & Ohio; T. O. Sechrist, assistant superintendent of machinery, Louisville & Nashville; A. J. Harner, lubrication engineer, Union Pacific; M. J. O'Connor, mechanical inspector, New York Central; I. T. Burney, lubrication engineer, Boston & Maine; E. Von Bergen, general air brake, lubrication and car heating engineer, Illinois Central, and E. C. Cromwell, lubrication supervisor, Baltimore & Ohio.

Discussion

(*The committee received from W. J. O'Neill, general mechanical superintendent Denver and Rio Grande Western the following written discussion*):

Mr. O'Neill: As last minute developments have made it impossible for a representative of this company to attend the annual meeting, I wish to submit the following discussion relative to use of split driving box brasses.

The record to date on this type of brass is as follows: Nine Mallets 2-8-8-2 type, 63-in. wheels, axle load 71,000 lb. total mileage 65,600, average mileage per box packed 845, maximum mileage on one cake of grease 9,950. On the main journals, the average mileage per cake of grease is 2,540. These locomotives cover a 148 mile division in five hours.

A sixty-day check of boxes packed at the 'away from home' terminal when using solid brasses showed 3.69 boxes per day. A similar check since using split brasses shows 2.36 boxes per day, a reduction of 36.2 per cent.

On the division where these locomotives operate, there is a total of 56 locomotives assigned. For the month of April 1930, with these split brasses in service, and considering all locomotives, the mileage per pound of driving box grease increased 41 per cent over April 1929 when all locomotives were equipped with solid brasses.

The average life of rod brasses has increased from 4,500 miles with solid driving brasses, to 8,200 miles with split driving brasses. As noted in the report, it is practicable to set up the wedges tighter when using split brasses.

One locomotive, after receiving split brasses, was taken directly from the drop pit without any break-in and run 45 miles at an average speed of 30 m. p. h., getting up to 45 m. p. h. without excessive heating.

Six 4-8-4 type locomotives with 70-in. wheels and 66,000 lb. axle load show a total mileage of 67,800 and an average mileage per box packed of 1,020 miles. These locomotives cover a continuous run of 745 miles in 25 hours. Maximum mileage on one cake of grease not yet determined as some of the original grease cakes are still running with a mileage of 8000. The average mileage on these locomotives is unduly low as due to a supply of unusually soft grease the boxes are repacked each round trip to avoid any possibility of trouble on through passenger trains. A heavier grease is now being used and the mileage is expected to increase. On one locomotive, using standard heavy grease the average mileage per cake of grease is 4,000.

On the 2-10-2 type locomotive, 63-in wheels, axle load 70,000 lbs., during a period of 26 days in May it was necessary to repack 39 per cent of boxes on a locomotive with split brasses as compared with 61 per cent on the same class of locomotive with solid brasses. A locomotive with split brasses made 6,000 miles without having any rod brasses renewed. We now have 46 locomotives equipped with the split brass.

Since the drawing of the split brass was furnished to the committee, a slight modification of the design has been decided upon. The one-piece retaining ring on the inside face of box will be made in two pieces with an opening at the top center line for convenience of inspectors.

O. S. Jackson (U. P.): On the road with which I am connected we have been experimenting with grease lubrication for the valve motion parts, spring rigging pins, also brake rigging, and the results we have obtained to date are very gratifying. In many cases the engines coming in for general repairs show a condition where formerly we would renew all the pins to the valve motion, now we find in many cases that possibly only a third or a half of the pins have to be renewed. The same applies to the spring rigging. We think that we have a better riding engine and a better and more free movement of the spring where we have the spring rigging pins lubricated.

We run these passenger locomotives as far as 800 miles between one greasing of the valve motion parts.

In regard to that part of the report that has reference to the split driving box, I will say that while my first impression of it was that it did not appear mechanical to me, however, I permitted its application to one pair of main drivers. I must say that our experience has not been as good as that which was represented by Mr. O'Neill.

We found that we got a pound in this box much sooner than we did with other engines of the same class where we had the conventional brass. The split brass now has run around 25,000 miles and possibly 30,000 miles, and we will have to drop the wheels. With the conventional brasses we get from 40,000 to 45,000 miles.

Mr. Brooks: We have regulations in effect which call for a 30 day greasing of parts of the spring equalizing system, and we have what we consider safe limits for the greasing of the motion work. But, the very first thing that we learned was this: As we got into long runs—and by long runs I mean where we run a locomotive through for 800 miles—that the natural tendency of every man on the road, in order to be sure of pushing that locomotive through successfully, is to squeeze all the greese he can into everything. The result is an increased grease consumption. Whether the loss which we are now sustaining through increased grease consumption is going to be substantially equalized by the saving in the wear of parts is a question which we have yet to determine.

Many of us are trying to do our lubricating work in strict accordance with the agreements which permit us to use a comparatively cheap class of labor. It is my impression that possibly a good many of us are going to find that we will have to consider the use of a little higher paid class of men, due to this increased use of grease with the large number of fittings, the heavy weights and the high speeds which we are now encountering.

I think that this extended use of grease is a thing that will need to be given careful consideration and that each road which goes into extended runs will find that it almost automatically will have an increased lubricating cost.

Mr. Ripley: One of the greatest operating problems that any mechanical man has to meet is to keep locomotives running cool. These bigger and longer engines, and higher speeds, have made a real problem out of it.

The committee has not referred to one development, however, which I think some of you have noticed from viewing the exhibits on the floor, and that is the tendency to go to the use of forced-feed lubrication. Personally I think that is fundamentally sound.

In my opinion our European friends have us beaten in regard to the lubrication of locomotives. I will admit that their locomotives are easier to lubricate, but I have seen with my own eyes enough to convince me that they are doing a better job of it. The reason is that they have gone to forced-feed lubrication generally. They put the oil where they want it and when they want it. I do not think that any mechanical man can quarrel with that principle.

There are many places on the locomotive where we can do that. It costs more money, but so do these failures cost money, and they cost a lot of money. For an engine-truck job I think tht forced-feed lubrication is the proper way to lubricate both the hubs and the boxes. As you all know, the hub is what we have trouble with. I do not mean that it will cure that trouble, but it certainly will help, and it has helped where it has been done.

I might refer specifically to the tender truck box. I think the A. R. A. design for a tender truck brass is wrong. Go all over this country and you can see men cutting off the brass in order to get it into the box. Now, at first you may say they should not do it, but when you get on the job you find that if they do not do it you will get collar heat. Theoretically, from the drawings, the brass is long enough. If the lugs are located exactly right, if the box is cast exactly right, if everything is perfect, the brass will go in. Actually those dimensions are not perfect, and if you force the brass in you run up against the collar and produce collar heat and possibly hot boxes.

Some roads have already started using shorter brasses. I think the A. R. A. would be better off if all of their brasses were cut ⅛ in. shorter than shown in the present manual. It is certainly better business to buy that brass shorter than it is to have your men cut it off and throw it away. The easiest way is to cut off the lug, and that is fundamentally incorrect, for if they are going to cut it off they should cut it off the end of the brass. You can't blame the man in the roundhouse. He has got to do that which is easiest and most convenient.

Therefore, I would like to suggest during the coming year that the Committee on Car Construction give consideration to a revision of the proposed standard drawings for A. R. A. journal box bearings.

L. Richardson (B. & M.): In regard to lubrication of the side rods, I want to say that you will find that the increased cost of the grease is very small, while the decreased cost of repairs more than offsets it, leaving a handsome saving. You can lubricate the side rods with pressure grease lubrication in about five to ten man-minutes in the roundhouse, where it will take you 40 to 45 man-minutes to do it otherwise. Furthermore, when the engine stops at a water tank, the engineman can grease the whole engine before the fireman has finished taking water.

Mr. Tatum: For the last ten years we have been using the shorter brass on all of our freight and passenger cars with a great deal of satisfaction. About a year ago we had a considerable amount of hot boxes on Pullman cars and tried to impress the Pullman Company's representatives with the fact that it was due to the length of the brass. After careful investigation they found we were right, and they, too, reduced the length of the brass. Since that time we have had wonderful results from the shorter brass.

E. B. Hall (C. & N. W.): We recently purchased thirty-five 4-8-4 type locomotives that are equipped with grease lubrication throughout, except for the guides which are lubricated by automatic-feed lubrication. We have experienced little difficulty with hot bearings. Our greatest trouble was trying to operate for too great a distance with some of the parts, especially the link box pins. We tried to operate a thousand miles, a round trip to Omaha and back. We are operating a distance of 500 miles to Omaha, but we have not as yet definitely determnied just how far we can run the various parts.

We have had a few hot driving boxes which were caused by lack of proper lubrication and proper attention before leaving the terminal. It is quite an undertaking to systematize your methods, and become so organized that the various parts will receive lubrication before the engine leaves the terminal.

What Mr. Brooks says about squeezing in the last bit of grease that you can get in is true. Our grease costs increased, due to waste, from that very practice, and it has been so especially with regard to driving boxes. The men who fill the boxes are getting in the last bit of grease.

However, I am convinced that lubrication costs will not increase when you have systematized the operation and deflnitely determined the runs that can be made with one greasing.

It is a good method, and I would not hesitate to go even further on an additional lot of locomotives than I did on these that I am speaking of. The outside bearing engine trucks have 88,000 lb. on the trucks, and have given absolutely no trouble. We have 72,000 lb. load per driving box, and they have given no trouble. I would subscribe to grease lubrication along those lines.

We have had no experience with the split driving box that was mentioned in the report, but from the reports that I have been able to get from our near neighbors who use them, they are not quite so encouraging.

E. Von Bergen (I. C.): Mr. Brooks and Mr. Hall brought out a feature that is of extreme importance in successful lubrication with the pressure-grease system on all of the various parts that have heretofore been lubricated with an engineer's hand oil can. When the system is first installed on the locomotives of a road the men who are assigned to the work are, it is true, prone to overlook certain fittings.

We found that in order to systematize this matter thoroughly it was necessary to have a double check at the periodical greasings. When the grease is applied, the top of the fitting should be wiped off in all cases so as not to force grit into the bearing. That being the case, if the fitting is wiped off, it is an indication of whether or not the man who uses the gun overlooked that fitting. We require the engine inspector to make his regular inspection after the greaser has applied the grease. It is part of his duty to note each of the fittings to see whether grease was applied.

My assistants in making their trips over the system from time to time inspect engines at random which have been O. K.'d. That is only intermittently but we have found by organizing that system that fittings are seldom overlooked. The men are all instructed, to begin with, where the fittings are. Every man who performs that work is given a list of certain engines.

As has been said by Mr. Hall, I believe, if the grease is properly applied, and you compare the same number of bearings that are lubricated with oil lubrication, you will find that the cost is not any greater and is substantially more efficient.

We frequently fall into an error in making these comparisons. We will compare a pressure-greased lubricated locomotive of a thousand engine miles with the same cost for car oil which has been used previously, but if we will go into the matter carefully and consider the different bearings that the hand oil can missed, and missed not once but regularly, and then compare that with grease lubrication where all of the bearings are greased, we will find that there is very little increase in cost and that the results obtained more than offset that small addition in cost.

Mr. Ripley mentioned that the committee had not reported on the matter of forced-feed lubrication, and the committee agrees with the thought that that also has great possibilities. Experimental installations have been started recently in various places for lubricating driving bearings, engine-truck bearings, and so on, with mechanical force-feed lubrication. One of the most difficult problems to overcome is that of oil-pipe breakage in the flexible connection. A lot of advancement has been made in applying flexible connections for these parts, the principle being to get away from the waste packed bearing. This has been a source of trouble, and always will be on account of the difficulty of maintaining contact of the waste packing with the journal, and in addition to that there is the tremendous amount of trouble with waste grabs. There are, undoubtedly, possibilities in mechanical lubrication if a system can be devised which will make it unnecessary to use waste packing along with it.

E. J. Bremmer, (C. G. W.): What source of bushing material is used in valve motion bushings in the research engines? Were they brass or steel, tight or loose?

Mr. Von Bergen: We used case-hardened bushings and pins. The bushings were tight. The pins moved in the bushings.

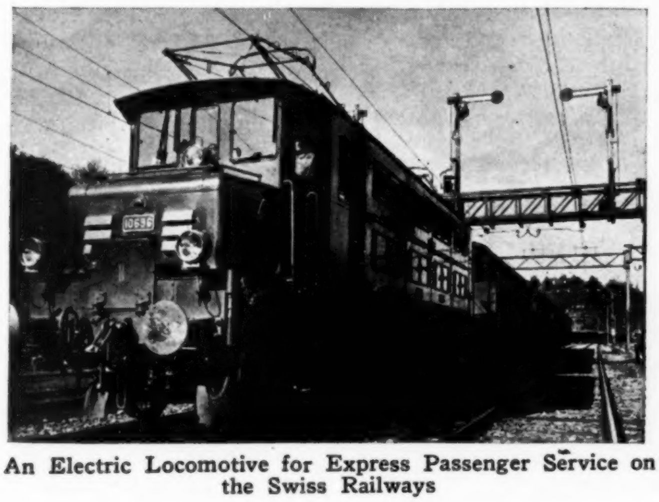
Mr. Hall: We do not have such a thing as a floating bushing in a valve motion on our railroad. In lubricating with grease, however, we allow just a little more clearance on fits, and best results are obtained by such practice.

Mr. Von Bergen: That is correct. A trifle more clearance is allowed for grease than oil on account of the greater viscosity of grease.

[*A motion to receive and print the report with a vote of thanks to the committee, and to continue the committee was carried.*]

The report of the Committee on Car Lighting was carried over and the meeting adjourned.

* * *



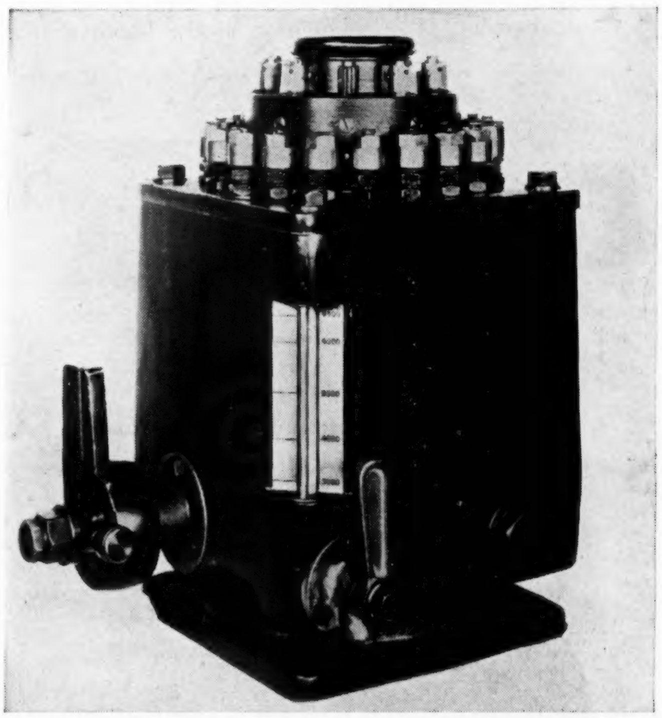
An Electric Locomotive for Express Passenger Service on the Swiss Railways

New Devices

Q & C Bosch Lubricator

A Bosch LHA locomotive-type, high pressure forced-feed lubricator is being exhibited by its railroad distributors, the Q & C Company, St. Louis. The lubricator is mechanically driven from any suitable reciprocating part of the link motion and is composed of individually adjustable pumping units. Each pumping unit consists of pump body with suction and pressure channels, a pumping plunger and an oil-guide plunger. They are grouped concentrically with the pump shaft and actuated by two common disc cams mounted on the shaft. The rotary motion of the pump shaft is directly converted into the reciprocation motion of the pumping and oil-guide plunger respectively.

The lower disc cam actuates the oil-guide plunger which makes one up-and-down stroke during one revolution of the pump shaft, allowing the oil to pass alternately to the two pressure channels of the pump unit.



The Bosch LHA Forced-Feed Lubricator

The upper disc cam engages the pumping plunger and causes the latter to make two suction and two pressure strokes during this time.

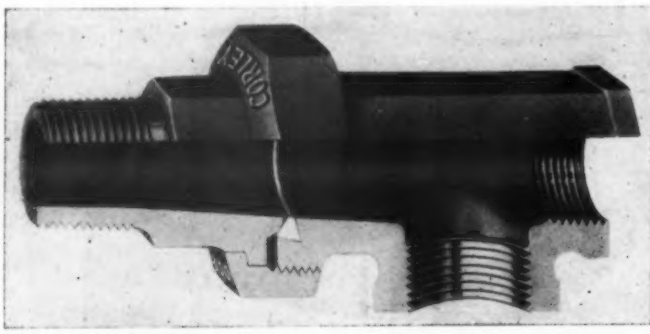
The individual pumping units are fastened to a base plate mounted on the pump shaft and can be removed singly for examination and renewal. This arrangement permits a number of pumping units to be provided as may be required, retaining the advantage that one revolution of the pump shaft allows for only two simultaneous pumping strokes. The vertical pump shaft is driven by a horizontally projecting lubricator shaft by means of worm gearing and a roller ratchet device. The entire working mechanism is immersed in the oil contained in the lubricator housing which serves as an oil tank. An

oil gage with a graduated scale is located on one corner of the lubricator housing. A hand crank is provided for priming the lubricator and feeding tubes mounted on the drive shaft.

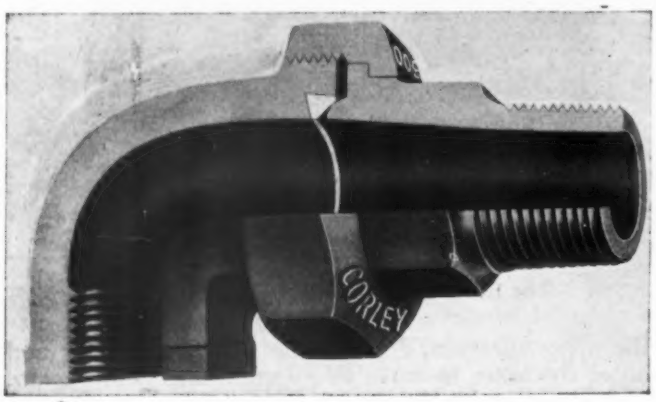
The rate of feed of the pump is controlled by the ratio between the lubricator drive shaft and pump shaft and by the adjustment of the individual pump unit. The normal pump shaft speed is 7 r.p.m. which takes care of all lubricating points requiring normal quantities of oil. A minor adjustment of the rate of feed is also obtained by varying the length of the oscillating lever. The effective stroke of the plunger of each pump unit can be adjusted independently by means of an adjusting screw, a right or left turn decreasing or increasing the quantity of oil delivered. The adjusting screw on each unit can be used to make its respective unit inoperative by turning it completely to the right. Each pump unit has two outlets through which an equal quantity of oil can be delivered alternately at alternate strokes when the cutlets are arranged for twin adjustability.

Corley Pipe Connections

A LINE of 300-lb. safe working pressure pipe connections, the parts of which are completely interchangeable, is on exhibition at the booth of the



A Corley Union Tee Illustrating the Free Runway



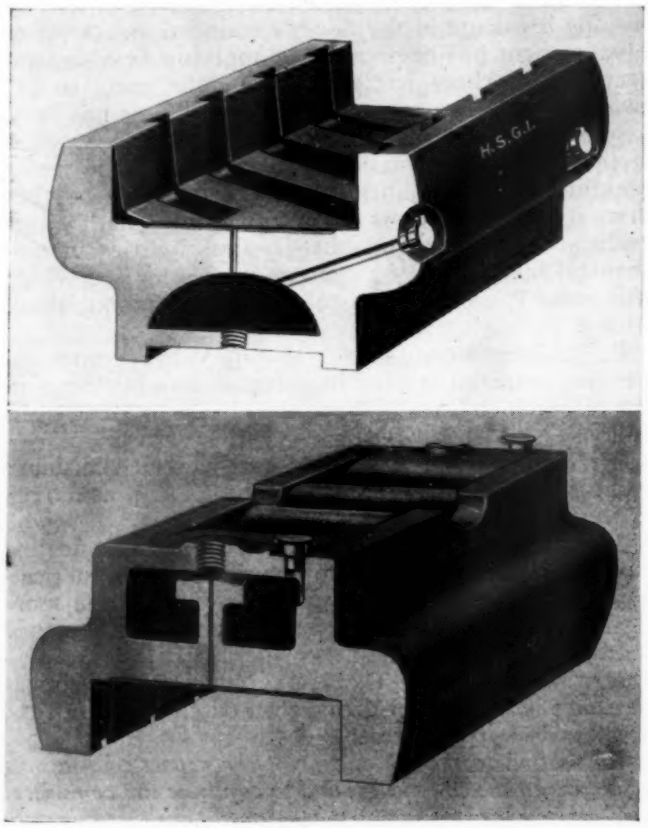
A Union Elbow Showing the Ball Joint and the Bronze Seat

Corley-DeWolfe Company, Elizabeth, N. J. The interchangeability of the parts of the fittings is assured by the fact that all parts of all types of fittings are machined to close limits. The ball face is machined to a master radius, the bronze seat being a true 45 deg. angle eliminating the necessity of grinding the two parts of the connections.

These valves are made of air-refined malleable iron. The line includes union elbows, union tees, male and female unions, and air compressor connections, all of which are individually tested. They have a free runway to remove the possibility of clogged lines.

The Hunt-Spiller Crosshead Shoes

THE Hunt-Spiller Manufacturing Corporation, Boston, Mass., has developed and has on exhibition crosshead-shoe castings which are provided with special lubricating pockets and devices. These pockets may be filled with lubricant capable of continuously lubricating the crosshead shoe while the engine



The Hunt-Spiller Crosshead Shoes with Special Lubricating Pockets

is in motion over periods of extended mileage, the design of the pocket being such as to control the amount of lubricant delivered to the guides. As the lubricant is expelled from these pockets by the motion of the shoe, it ceases to flow while the engine is standing.

Byers Wrought-Iron Locomotive Forgings

WROUGHT-IRON locomotive forgings, made possible by the Byers process for producing wrought-iron in tonnage quantities, are being exhibited at the booth of the A. M. Byers Company, Pittsburgh, Pa. The display of wrought-iron products

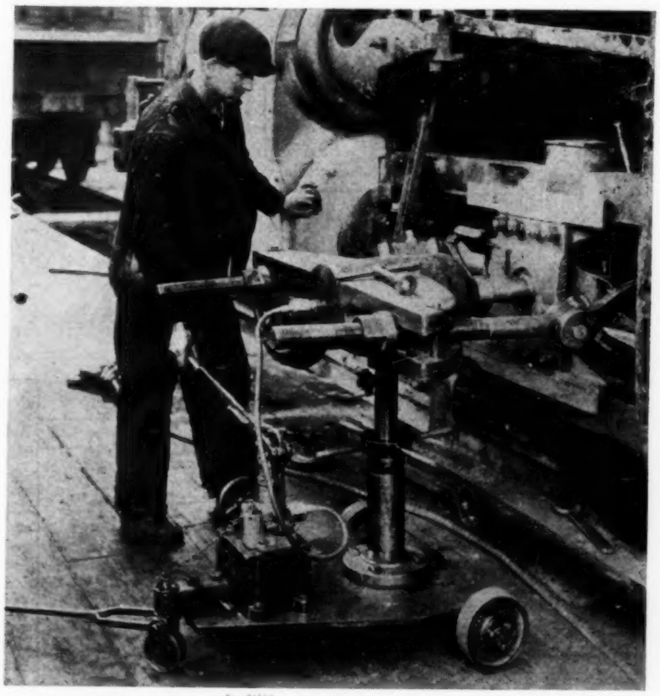
at the Byers booth includes forgings and other products that have been subjected to various tests of the material, including fractured, step-tested and etched section of wrought-iron together with other specimens that have been in actual service. A bureau of Standards report indicates that wrought-iron produced by the Byers process is of very uniform quality.

Byers wrought-iron is to be produced in tonnage quantities at the Byers plant being built at Pittsburgh, Pa., which will have facilities for an initial production of 250,000 tons per year and an eventual annual capacity of 550,000 tons.

Hydraulic Pin Ejector

INCLUDED in the exhibit of railroad shop devices of Watson-Stillman Company, New York, is the Shaffer-Watson-Stillman hydraulic machine for the removal of crosshead pins. It is designed to prevent upsetting, bending or distorting of wrist pins and to insure safety. While designed especially for removing crosshead pins, the ejector is adaptable to a variety of operations ordinarily done with a sledge or a ram.

The machine is a self-contained portable unit, thus eliminating the necessity of gathering rigging and miscellaneous gear together. Two special hook rods are furnished, one shaped for the piston rod and one having double horns for gripping the connecting rod. The pump is of the single-plunger type and is mounted on the tank containing the operating liquid. The release valve is built into the body of the pump.



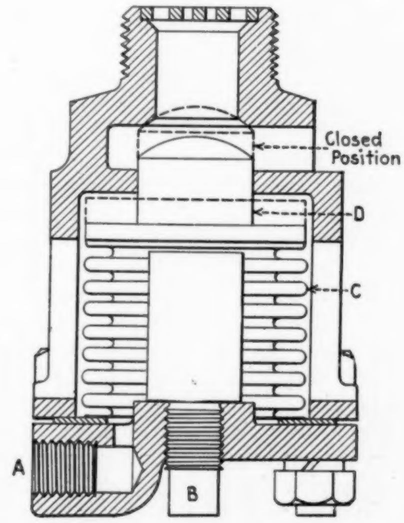
The Shaffer-Watson-Stillman Hydraulic Pin Ejector

The ram is provided with a rack and pinion device for moving it quickly up to the pin and for returning the ram to its back position. An important feature of the machine is the elevating screw and hand nut by which the height of the cylinder and ram is adjusted to suit the crosshead pin. The machine is built with a capacity of 60 tons.

Ardco Safety Cylinder Cock

THE Ardco Manufacturing Company, Hoboken, N. J., is exhibiting an improved design of its cylinder cock which automatically opens when pressure in the cylinders becomes greater than boiler pressure because of high compression or pocketed water. The cylinder cocks remain closed when drifting, preventing air or foreign substances such as gravel, cinders, etc., from being sucked into the cylinders through the cylinder cocks.

Air pressure from the main reservoir is connected to the cylinder cock at *A* and communicates with the interior of the bellows *C* after passing through the operating valve located in the locomotive cab. When the cab valve is opened, the air pressure expands the bellows, holding the plunger *D* in the closed position against the steam pressure acting on the small area of the plunger, which thus acts as a safety valve on the steam cylinder. The cylinder cock can be opened by shutting the cab valve controlling the air line of the cylinder cock. If the air line should break or become otherwise inoperative, a quick repair can be made by screwing up the stop screw *B* until plunger *D* seats in its closed position.



The Ardco Cylinder Cock

Tolhurst Oil Clarifier

THE Tolhurst Machine Works, Inc., Troy, N. Y., has in operation in its booth a laboratory-size Tolhurst oil clarifier, using a solution to show how the separation and removal of solids from the oil is effected. The small machine is an exact reproduction of the large 40-in. diameter unit used for the clarification of oil in the Tolhurst process for reconditioning car-journal waste and oil.

The unit is comprised of a 40-in. container in which revolves a basket that contains the waste and oil that is to be reconditioned. The container serves as a foundation for a yoke support for a vertically-suspended motor which drives the basket. The revolving basket is equipped with horizontal vanes that are designed to facil-

itate the separation of the solids from the oil and to retain the oil for a considerable period of time to assure the complete separation of the solids. At the completion of the process the waste is retained in the basket and the oil discharged from the bottom of the container.

The basket has a capacity for holding 50 gals. of waste and is capable of clarifying 400 gals. of oil per hour. When in continuous operation it is only necessary to clean the basket every other day.

Service Tests of Enduro On the Firebox Plate

THE Republic Steel Corporation, Youngstown, Ohio, has on exhibit a pair of ¾-in. side-sheets of Enduro Type A, a high chromium iron, which were installed in Locomotive No. 631, on the Nickel Plate June 6, 1928. Engine No. 633 on the same division and in the same service had a pair of ordinary steel sheets that were removed on account of bad corrugation and cracking on the fire side of the plate at the staybolt holes. Both locomotives ran nearly the same mileage. The Enduro plates were in good condition at the end of the mileage, but some cracks were made during the re-driving of staybolts on Class 3 repairs. These cracks were similar to those that often occur when re-driving staybolts in ordinary steel plates that have been in service.

Investigation shows that both ordinary steel and Enduro A are more brittle at room temperatures after they have been in service than when installed. This brittleness is not in evidence if the plates are warmed up (around 212 deg. F.) when re-driving bolts. The following table shows the date obtained in the service tests and examination of the plates after removal. The plates were sand-blasted after removal to remove dirt, scale, etc.

Comparison of Enduro A and Steel Firebox Plates After Service Test

Engine Nos.	631	633
Side sheets	Enduro A	Regular steel
Type	2-8-2	2-8-2
In service	16 months	18 months
Feedwater heater	Worthington	Elesco
Stoker	Duplex	Duplex
Staybolts	1 inch hollow flexible	⅞ inch solid flexible
Washout period	1,200 miles	1,200 miles
Mileage on plates	69,492	69,398
Cause of removal	Cracked on redriving of staybolts.	Corrugation; 56 staybolt holes showed cracks in plate.
Condition of water side.	Scale falls off plate in hot zone when washing out. No corrosion or strain lines on the surface.	About 1-16 inch scale adhering. Grooving about 1-16 inch deep along mud ring. Strain lines in the plate arourd holes.

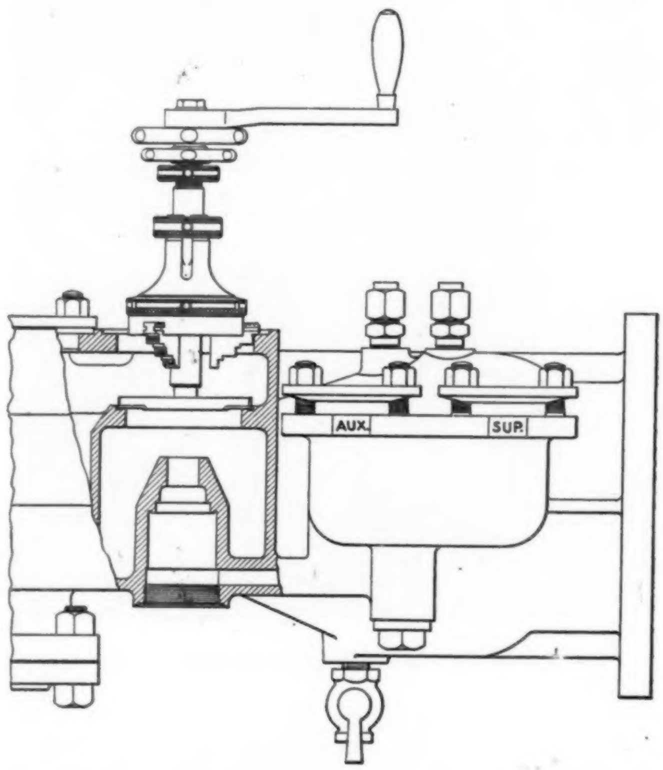
These plates were under as nearly the same conditions of service as is possible when in different locomotives, having the same mileage, on the same division and in the same class of service. The carbon steel plate was deteriorated sufficiently to cause removal. The Enduro plate was good as far as resistance to corrosion, cracking and corrosion, but six small cracks (¼-in. to ½-in. long) and one longer crack (2½-in. long) were caused by redriving the staybolts at shop temperature. The driving of the staybolts at room temperature was done in the nature of a test to determine if such procedure could be followed. It is evident that room temperature is not suitable for this operation. The manufacturers recommend a temperature near the boiling point of water when redriving staybolts.

The resistance of this material to heat and corrosion seems to have been demonstrated up to the point at which this test was stopped. Additional service tests are needed to prove this material fully. One peculiar and noticeable feature was noted in the inspection after washing out, and that was that the boiler scale fell off the plate in the hot spot in the sides. This undoubtedly kept the plate below the temperature at which bulging would occur. This is probably caused by the fact that the Enduro A has a lower expansion, with the same temperature rise, than ordinary steel.

Reseating Tools for Exhaust-Steam Injector

A SET of portable tools for reseating the valves of Elesco exhaust steam injectors, manufactured by the Leavitt Machine Company, Orange, Mass., and distributed by the Superheater Company, New York, is on exhibit at the booth of the former company. The set consists of a self-alining and self-centering universal chuck and a series of milling and recess cutters.

The tools can be set-up on the injector and the valves reseated while they are in place. It operates with a



The Leavitt Reseating Tools in Place on One of the Valves of the Elesco Exhaust Steam Injector

ratchet handle and is equipped with a micrometer feed. The cutters are non-chattering and are designed to produce a finished valve set that requires no hand grinding or lapping. The tool set is designed for refacing all of the seats on the injector.